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Biological & Medical Serials

TROPICAL DISEASES BULLETIN

Vol. 17. 1921. No. 2.

MEDICAL ZOOLOGY, MALARIA, PELLAGRA, YELLOW FEVER.

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TROPICAL DISEASES
BUREAU.

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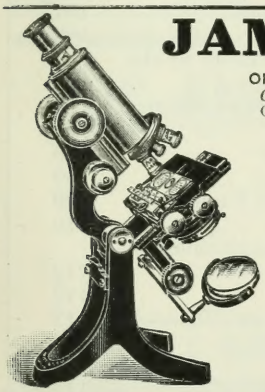

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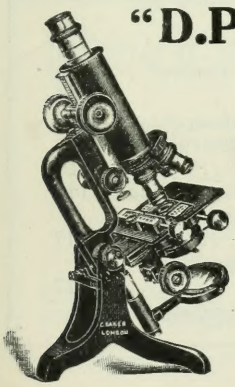

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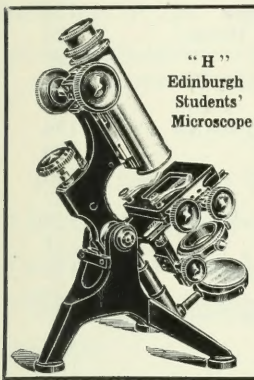

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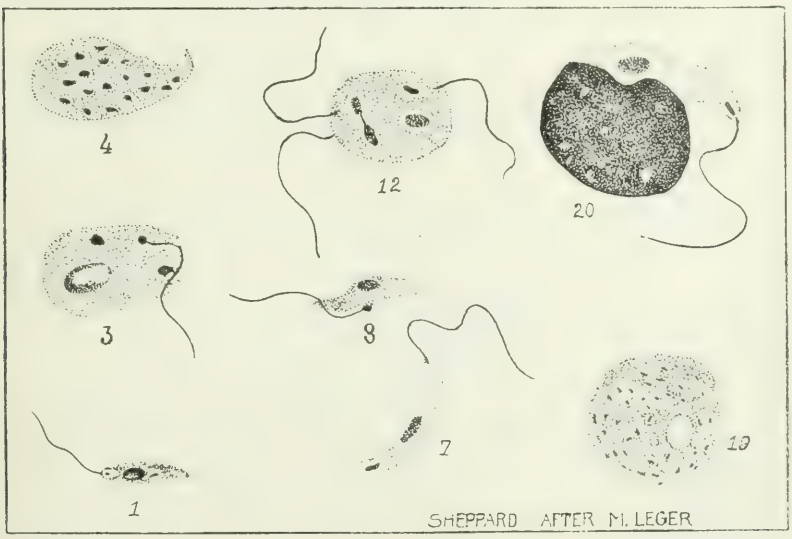
LEGER (Marcel). **Pyrexie mortelle à allure spéciale, causée par un flagellé à la Guyane française.** *Ann. Inst. Pasteur.* 1920. Aug. Vol. 34. No. 8. pp. 481–496. With 1 chart in text and 1 plate.

In the course of three years in French Guiana the author has met with two cases of a strange fever not attributable to any known parasite; in one of them, which had a fatal issue, a flagellate was discovered in the blood during life and in smears of liver after death.

The flagellate, for which the author proposes the provisional name *Trypanopsis malignus* (sic), is finely figured in its protean forms—Leptomonad, Crithidid, Trypanoid with long flagellum but destitute of undulating membrane, various bizarre shapes like some of the evolutional and dividing forms of the rat trypanosome, and various non-flagellate forms. The author compares it with, and sufficiently differentiates it from, *Schizotrypanum cruzi* and "*Haemocystozoon*" *brasiliense*, its local congeners or confamiliars.



Trypanopsis maligna Leger.

Figs. 1, 3 and 4; Forms seen in the blood. Figs. 7, 8 and 12; Forms seen in smears of the liver. Figs. 19 and 20; Leucocytes engulfing the parasites.

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The patient in this fatal case was a Corsican of 48 years, who had served in Guiana for 11 years, with only one short leave to Europe, and whose antecedent history was clear of everything but a single attack of malaria. His health had been very good until, in the 11th year of service, he was admitted to hospital for high fever, with asthenia, gastric and haemorrhoidal troubles, and symptoms of pulmonary emphysema.

When discharged, after a short detention, he did not regain his former robust health, but was for months subject to periodic attacks of fever lasting for 3 or 4 days, associated with hepatic pain and haemorrhoidal flux ; and finally at the end of about 11 months he was back in hospital in a state of great prostration, with a temperature ranging from 39·5° C. to 39·8° C., vomiting of bile streaked with blood, bright blood in stools, and enlarged liver and spleen. The temperature fell, and remained for about a week between 37° and 38° C., but then gradually rose to 40° C., with a second paroxysm of vomiting of blood-streaked bile, small haemorrhages from the intestine, and pains in several large joints. The second paroxysm lasted 3 or 4 days and then ended in lysis, but was followed in about a week by a third paroxysm lasting three days with evening temperatures up to 39·3° C. : the examination of the blood at this time showed extreme anaemia, with lymphocytosis and eventually some very sparse flagellates. Following this third paroxysm the temperature remained about 38° C. for about 10 days, when there supervened violent rigors, a rapid rise of temperature to 40·7° C., and fatal collapse with profuse sweats, intense dyspnoea, and praecordial anguish.

During the course of the illness conjectured blood and intestinal parasites, protozoan and bacillary, were searched for carefully. After death the liver and spleen were found enlarged, but of normal consistence ; there was no inflammation or ulceration of the intestine ; the kidneys appeared healthy ; and an investigation for *Micrococcus melitensis* was negative. Smears of the liver showed the flagellate parasite provisionally to be known as *Trypanopsis maligna* Leger.

A. Alcock.

Laveran (A.) & Franchini (G.). **Sur les flagellés parasites de quelques insectes et sur les infections qu'ils peuvent produire chez les souris.**— *Bull. Soc. Path. Exot.* 1919. Nov. Vol. 12. No. 9. pp. 665–671. With 2 text figs.

Pure cultures of *Herpetomonas ctenopsyllae* and of *H. ctenocephali* are easy to obtain on account of the paucity of associated bacteria in the intestine of the respective fleas. The morphological characters of both are much alike except that *H. ctenocephali* often has a long flagellum. [The flattened helicoidal *Herpetomonas* described by Chatton from *Ctenocephalus canis* is considered by the authors to be either a distinct species, or a curious variety of *H. ctenocephali*].

Pure cultures of *Herpetomonas jaculum* from *Nepa cinerea* and pure cultures of *Crithidia melophagi* are difficult to obtain by reason of the multitude of associated bacteria. The difficulty with *H. jaculum* was surmounted by peritoneal infection of a young mouse with flagellates taken from several Nepas, and making cultures on simplified Novy medium from the blood of the liver of the infected mouse ; and in the case of *C. melophagi* by inoculating tubes of simplified Novy medium strongly alkalinised with the intestinal contents of *Melophagus*, the alkali favouring the growth of the flagellates and hindering the bacteria.

The authors have observed the pathogenic effects in white mice of *pure* cultures of *Herpetomonas ctenocephali* and *Crithidia melophagi*. Of 16 mice so inoculated 9 died or were killed in anticipation of the end. The youngest mice were the most seriously affected. In the blood the infection was indicated by Leishmania-like parasites free or intracorpuscular, and except in the serious cases rare. The symptoms were anaemia, with hastened respiration, loss of appetite and wasting, and often at a late stage diarrhoea. *Post-mortem* the liver and spleen were found enlarged; in liver smears plentiful Leishmania-like parasites, and also *Herpetomonas* forms, sometimes with shortened flagellum; in spleen smears the parasites were rarer, and in smears of lung and bone-marrow rarer still.

Besides the above described inoculations, the authors also passed on the infection from mouse to mouse by means of peritoneal inoculation of infected blood or brayed liver; but they did not observe any increase of virulence by passage through the mouse.

A. A.

Laveran (A.) & Franchini (G.). **Infections expérimentales de chiens et de cobayes à l'aide de cultures d'***Herpetomonas* **d'insectes.**—*Bull. Soc. Path. Exot.* 1920. July 7. Vol. 13. No. 7. pp. 569–576 With 1 fig. in text.

Particulars are here given of the results of inoculating dogs and guinea pigs with cultures of the herpetomonads of certain insects.

A dog inoculated subcutaneously with *H. phlebotomi* developed, eight days afterwards, sores resembling those of leishmaniasis with an exhibition of organisms extremely like *Leishmania tropica*.

A young puppy similarly inoculated grew thin, weak, and anaemic. 23 days afterwards some Leishmania-like organisms were found in its blood, and when it was killed 116 days after, plenty of these were present in liver, spleen and bone-marrow.

8 guinea-pigs were inoculated *viâ peritoneale*, 3 with *H. ctenocephali*, 2 with a variety of *H. ctenocephali*, and 3 with *H. phlebotomi*. One guinea-pig, a very young one, died, with Leishmania-like bodies in liver, spleen, bone-marrow, etc., these bodies having been found in the blood during life. The other 7 animals were killed 44 to 113 days after inoculation, and in every instance Leishmania-like bodies were found in the organs above specified.

One guinea-pig was inoculated in the testicle with *H. ctenocephali* var. *chattoni*. A limited local infection ensued, and when the animal was killed 116 days afterwards the testicle was found to be atrophied.

A. A.

Tejera (E.) **Un nouveau flagellé de** *Rhodnius prolixus*, *Trypanosoma* (**ou** *Crithidia*) *rangeli* **n.sp.**—*Bull. Soc. Path. Exot.* 1920. July 7. Vol. 13. No. 7. pp. 527–530. With 2 figs. in text.

The author describes, as *Trypanosoma rangeli*, a new kind of trypanosome from the intestine of the Reduviid bug *Rhodnius prolixus*. *T. rangeli* has no resemblance to *T. cruzi*, with which it may be associated in this bug, the blepharoplast of the new species being a small dot or rod, and the undulating membrane being strongly sinuous. Besides typical trypaniforms, crithidiaforms and squat non-flagellate forms occur.

A. A.

Reichenow (E.). *Eutrichomastix lacertae* **im Blut und in blutsaugenden Milben.** [*E. lacertae* in the Blood of Lizards and in Blood-Sucking Mites.]—*Cent. f. Bakt.* 1 Abt. Orig. 1920. July 21. Vol. 84. No. 6. pp. 466–478. With 1 plate.

In the course of work in Madrid the author had under observation two lizards (*Lacerta muralis* and *viridis*) fatally infected with a trichomonad, *Eutrichomastix lacertae*. The flagellates were present not only in the hind-gut and cloaca—where they are of normal occurrence in almost all the lizards of Madrid—but also in the mid-gut, ureters, and kidneys, and also abundantly in the blood. Subsequently the author was able to follow the trichomonad into mites (*Liponyssus saurarum*) taken from one of the lizards, and he figures an epithelial cell from a mite's gut with three individuals of *Eutrichomonas lacertae* lying in a vacuole.

Obtaining a young lizard believed to be new-hatched and at any rate passing faeces in which flagellates could not be detected, the author fed it with several of the mites taken from the infected lizard specified above. Remains of mites were detected from time to time in the faeces, and on the 7th day a cob of faeces removed by gentle pressure was found to be swarming with *Eutrichomastix lacertae*.

The author gives a list of recorded cases where flagellates normal to the intestine (Bodo, Leptomonas, Lamblia, Hexamitus, Trichomonas, Tetratrichomonas, Eutrichomastix) were found in the blood of their host. In most of these cases the discovery of the flagellate thus out of bounds was made after the host's death, but in some cases it was made in life.

The author's present investigations lead him to support the conjecture that the appearance in the blood of parasites regarded as proper to the intestine of their host may be a normal event. His particular conclusion, with regard to *Eutrichomastix lacertae*, is that it is within a short step of being turned into a blood-parasite.

A. A.

Reitler (Rud.) & Robicsek (Hans). **Zur Kenntnis der Flagellaten im menschlichen Harn.** [Flagellates in Human Urine.]—*Cent. f. Bakt.* I. Abt. Orig. 1920. Feb. 11. Vol. 84. No. 2. pp. 129–132. With 1 plate.

The authors describe and figure a Bodo-like flagellate with amoeboid, multinucleate-encysted, and single-flagellate forms, which they have observed four times in human urine. They differentiate it from *Bodo urinarius* and other urine protozoa.

A. A.

Gózony (L.) **Kultur von Flagellaten in festen Nährböden.** [Cultivation of Flagellates on Solid Media.]—*Cent. f. Bakt.* 1 Abt. Orig. 1920. Aug. 14. Vol. 84. No. 7-8. pp. 565–566.

For the cultivation of flagellates and maintenance of isolated colonies the author approves of agar-agar with rabbit-kidney without any admixture of blood. Prepared agar-tubes (thinned broth with 2 % peptone and ½ % agar-agar, neutralised with 5 cc. to the litre 10 % $Na_2 CO_3$ solution) are liquefied at 45° C. and charged with rabbit-kidney and then inoculated. In a week, at room temperature, the growth of the flagellates is manifest.

A. A.

Chatton (Edouard). **Culture indéfinie d'un Trichomonas intestinal du cobaye, essais de purification, action morphogène des milieux sur la membrane ondulante.**—*C. R. Soc. Biol.* 1920. Jan. 24. Vol. 83. No. 3. pp. 69–72.

The author has already described [this *Bulletin*, Vol. 13, pp. 17–18] the cultivation of a *Trichomastix* of the Geckonid *Tarentola mauritanica*, which, though an intestinal parasite, may find its way into the blood. He found that it could be continued indefinitely on a medium of very slightly acid (incompletely neutralised) bouillon with added blood, under vaseline.

In the case of the cultivation of the purely intestinal Trichomonas of the guinea-pig the author finds that the concomitant intestinal bacteria in the culture furnish adequate anaerobic conditions without the vaseline, and that Trichomonas prefers an alkaline medium. 10 cc. of completely neutralised meat bouillon, with 1 cc. of rabbit-blood added, is a consistently good soil.

With reference to the generic distinction between Trichomonas and Trichomastix, that the former possesses an undulating membrane in place of the trailing flagellum of the latter, the author notes that in Trichomonas in culture the undulating membrane may by detachment become a free flagellum, and conversely, that when such modified forms are inoculated into the peritoneum of a guinea-pig the trailing flagellum becomes by adherence an undulating membrane some hours afterwards. From these phenomena the author infers that the distinction between the two genera is what he judiciously calls " caducous" and as of the same biological significance as the distinction between *Bodo* and *Trypanoplasma*.

A. A.

Cress (Walter W.). **Intestinal Parasites as a Cause of Appendicitis : Report of a Case.**—*Med. Record.* 1920. July 24. Vol. 98. No. 4. pp. 143–144.

Report of a case of a well developed young male, a native of North Dakota, admitted to hospital and successfully operated on for acute appendicitis. Subsequently he had an attack of acute and profuse diarrhoea, and a multitude of active *Lamblia intestinalis* was discovered in the stools. The removed appendix was *not* subjected to microscopic examination.

A. A.

Carr (E. I.) & Chandler (W. L.). **Successful Treatment of Giardiasis in Man with Neo-Arsphenamin.**—*Jl. Amer. Med. Assoc.* 1920. May 22. Vol. 74. No. 21. pp. 1444–1445.

The authors state that " not only the cysts of *Giardia intestinalis* and *Chilomastix mesnili*, but also those of *Endamoeba coli*, *E. histolytica*, and *E. nana* rapidly disappeared from the stools of man following intravenous injections of neo-arsphenamin, and that the cysts of *Eimeria stiedae* disappeared from the faeces of rabbits following intramuscular injections of heavy doses of neo-arsphenamin " ; but whether or not the results are permanent " is yet to be determined."

In the single Giardia (Lamblia) case here reported, after unsuccessful treatment with emetin and also with sulphur, an intravenous injection of 0·6 gm. of neo-arsphenamin was tried : the stools were examined for the following six days, and no cysts were found. Twenty-five days afterwards, however, owing to return of abdominal discomfort, the

stools were again examined and were found to contain cysts. Consequently another intravenous injection of the same dose was given on that day and was followed at successive intervals of five days by two similar injections. The cysts disappeared again on the second day after the first of these injections and have not recurred since—the last injection on the 2nd Jan. 1920.

A. A.

França (Carlos). **La flagellose des euphorbes.**—*Ann. Inst. Pasteur.* 1920. July. Vol. 34. No. 7. pp. 432–465. With 2 plates and 2 text-figs.

Among other things in this long and finished study the author distinguishes and validates the genus *Leptomonas*. In *Leptomonas*, of which *L. drosophilae* is made the type with *L. donovani* and *L. davidi* as congeners, the flagellum springs directly from the blepharoplast which is usually small, and fission commences with the blepharoplast, the flagellum being a new formation. In *Herpetomonas*, of which *H. muscae-domesticae* is the type, the blepharoplast is usually very large, the flagellum springs from a rhizoplast, and fission commencing with the rhizoplast results in a duplication of it and flagellum.

The evolution of *L. davidi* in *Stenocephalus agilis* is described and figured. The ingested leptomonads multiply at once, and very actively, by binary and multiple fission : about the third day, when they are extremely numerous, a process of what the author regards as isogamy may occur—two stout forms which have lost the flagellum become connected anteriorly and their trophonuclei and blepharoplasts become intermingled : between the 14th and 18th days a multitude of very minute forms, for the most part non-flagellate, appear : they are found in all parts of the alimentary canal but most abundantly in the mesenteron ; they ultimately crowd into the salivary glands, and they are styled infective forms by the author. Cystic forms are never abundant in the insect : they have been noticed in the intestine and rectum (and, also, though as a remnant of infection as the author thinks, in the proboscis).

The evolution of *L. davidi* in Euphorbia has not been experimentally carried out by the author, but is constructed from repeated examinations of natural inoculations of plants (*accidents primaires*). In such foci are to be found, in addition to the ordinary leptomonads, minute forms—both flagellate and non-flagellate—similar to the " infective forms " of the insect's salivary glands, also small rounded non-flagellate forms and piriform flagellate forms. Thus *L. davidi* when inoculated into the plant may assume forms like that of *L. donovani* when inoculated into animal tissues.

The author has failed to infect animals with *Leptomonas davidi* from latex of Euphorbias, but has not yet experimented with the insect-borne strain of the parasite.

A. A.

de Mello (Froilano) & Jacques (J. E.). Note sur l'existence de l'*Herpetomonas muscae domesticae* à l'Inde Portugaise.—*Bol. Ger. Med. e Farmacia.* Nova Goa. 1919. May. Vol. 5. No. 5. pp. 194–195. [Received July 17th, 1920.]

A description of a well-known parasite of the housefly : the author notes its polymorphism and the great length of the flagellum in some individuals.

A. A.

Aragão (Henrique de Beaurepaire). **Classificação dos Hemosporídios.** [Classification of the Haemosporidia].—*Mem. Inst. de Butantan.* 1918–19. Vol. 1. No. 2. pp. 167–185. With 4 plates. [English summary p. 185.]

The author agrees that the Haemosporidia must be kept quite separate from the Haemoflagellata.

In dealing with the Haemosporidia, guided both by morphological and biological characters, he divides them into 4 super-families—*Haemogregarinoidea*, Poche ; *Achromaticoidea*, nov. ; *Plasmoidoidea*, nov. ; *Toxoplasmoidea*, nov.

The Haemogregarinoidea include two families, namely, Haemogregarinidae with genera *Haemogregarina*, *Lankesterella*, *Karyolysus*, and *Hepatozoon* ; and Leucocytozoidae with one genus *Leucocytozoon*.

In the Achromaticoidea also two families are included, namely, Achromaticidae with *Achromaticus*, *Smithia*, *Ellipsisoma*, *Rossiella* and *Rangelia* as genera ; and Theileridae, nov. for the single genus *Theileria*.

The Plasmodoidea also are composed of two families, namely, Haemoproteidae for the one genus *Haemoproteus* ; and Plasmodidae containing the genera *Plasmodium* (with *Laverania* as a subgenus), and *Haemocystidium*.

The Toxoplasmoidea, which the author regards as an Appendix of the Haemosporidea, are ranked in one family Toxoplasmidae and one genus *Toxoplasma*.

Toxoplasma avium Marullaz the author thinks to be not a true Toxoplasma, but a Haemogregarinid of the Hepatozoon series.

A. A.

i. Sergent (Etienne). **Le *Plasmodium relictum*, agent pathogène du paludisme des oiseaux, ne donne pas une maladie mortelle au moustique transmetteur.**—*Bull. Soc. Path. Exot.* 1919. Nov. Vol. 12. No. 9. pp. 601–603.

ii. **Dans le paludisme des oiseaux (dû au *Proteosoma*), il n'y a pas de parallélisme entre l'infection sanguine de l'oiseau et l'infection consécutive du moustique contaminé par l'oiseau.**—*Ibid.* pp. 603–605. With 1 text fig.

i. This paper disposes of Ruge's dictum (Handbuch der Tropenkrankheiten, 1st Ed. Vol. 2, p. 826) that Plasmodium (Proteosoma) is pathogenic to the insect intermediary.

The author has observed hundreds of cases of massive infection (at least a hundred full ripe oocysts in each stomach) of Culex with *P. relictum*, hundreds of cases of a slight infection, and great multitudes of fresh uninfected Culex, all under the same ménage and at divers seasons, but never has he observed any greater mortality among the infected insects than among the fresh and uninfected, nor has the growth of the Plasmodium appeared to be hurtful to the infected insects.

ii. In the Plasmodium (Proteosoma) infection of birds after an incubation period of 3 to 10 days the parasites become very numerous in the blood and remain numerous for about a week. From 3 to 6 days later, if the bird survives, the parasites become very rare ; and, subject to some irregular revivals, the parasites are either extremely rare or cannot be discovered at all, by careful scrutiny, in the 6th or 7th week : nevertheless the bird's blood is still infective to Culex.

A. A.

Guyénot (Emile) & Naville (André). **Sur un sporozoaire de la couleuvre, vraisemblablement inoculé par un trématode parasite.** —*C. R. Soc. Biol.* 1920. June 26. Vol. 83. No. 22. pp. 965–966.

In examining a lot of grass-snakes (*Tropidonotus natrix*) heavily infested with trematodes and nematodes, the authors found in the dorsal muscles of the reptiles numerous small white tubules, from 1 to 3 mm. long, stuffed with pansporoblasts and free spores of some microsporidian (or sarcosporidian) parasite ; also, in the connective-tissue, other larger ovoid cysts having a cortex of large-nucleated cells containing spores in divers stages of development ; also cysts of an extraordinary kind containing not spores but degenerate tissue-cells of the host.

Searching for the origins of this sporozoan infection in the intestinal tract the authors found, in the snakes' stomach, trematodes containing similar spores in all stages, from pansporoblasts to sporocysts holding sometimes 2, sometimes 4 sporozoites. The presence of spores in the ovary of these infected trematodes justifies the suspicion that the infection may be persistent in all the propagative stages of the trematode.

The authors regard the trematode parasite of the snake as the actual agents of its sporozoan infection.

A. A.

Nöller (W.). Die neueren Ergebnisse der *Haemoproteus*-Forschung. Zugleich vorläufige Mitteilung ueber das Kreuzschnabeltrypanosoma und ueber Züchtungsversuche an einigen anderen Trypanosomen. [Recent Work on Haemoproteus, with a Preliminary Note on the Cross-bill Trypanosome and Cultural Experiments with other Trypanosomes.]—*Arch. f. Protistenk.* 1920. June 10. Vol. 41. No. 1. pp. 149–168.

A review of recent work not unfolding anything novel.

A. A.

Carini (A.). Sur un Leucocytozoon d'une chouette [owl] du Brésil.—*Bull. Soc. Path. Exot.* 1920. July 7. Vol. 13. No. 7. pp. 506–508.

The Leucocytozoon here very briefly described was found in coexistence with a Halteridium in a *Scops brasiliensis*. Whether or not it is different from *L. Ziemanni* is, as the author admits, a question to be asked. If it should turn out to be distinct the author would name it *L. Lutzi* after its discoverer.

A. A.

Langeron (M.). Note additionnelle sur une Hémogrégarine d'un Macaque.—*Bull. Soc. Path. Exot.* 1920. June 9. Vol. 13. No. 6. p. 394.

The monkey-haemogregarine described by the author as *Haemogregarina Blanchardi* (see this *Bulletin*, Vol. 16, p. 95) is now re-named *H. cynomolgi*, the name originally given being "preoccupied."

A. A.

du Toit (P. J.). **Zur Systematik der Piroplasmen.** [Classification of the Piroplasmata.]—*Arch. f. Protistenk.* 1918. Aug. 10. Vol. 39. No. 1. pp. 84–104. With 10 text-figs.

A taxonomic revision of the Piroplasmata, with commentary and bibliography.

The author segregates the members of the group in two families, Babesdae and Theileridae, and, while ejecting them from the Haemosporidia and agreeing with those who include them with the Flagellata, admits that they are difficult to place.

Deliberately limiting his outlook to the ascertained Vertebrate limits of the life-cycle, and allowing that finality cannot be claimed for a scheme that perforce leaves the intermediary Ixodine out of the reckoning, he offers the following classification of these two families.

Family I.—Babesidae, defined as endoglobular blood-parasites of vertebrates, transmitted by Ixodine ticks, constantly devoid of pigment, and multiplying in the blood stream by bi- or quadri-partite division.

Genus 1.—*Babesia* Starcovici, 1893. Defined as parasites developing as pear-shaped bodies disposed in the red blood-cell in pairs; fission bi-partite. Two subgenera, *Babesia* and *Piroplasma*.

Subgenus 1a.—*Babesia* Starcovici. Relatively small parasites (less than 2·5μ long) of irregular shape, seldom typical double pears; fission simple. Includes *B. bovis* Babes (Cattle); *B. ovis* Babes (Sheep); *B. argentina* Lignières (Cattle); *B. muris* Fantham (White rat); *B. gibsoni* Patton (Dog and Jackal); *B. divergens* McFadyean and Stockman (Cattle); *B. soricis* Christophers (Shrew).

Subgenus 1b.—*Piroplasma* Patton, 1895. Relatively large parasites (more than 3μ) with two nuclei, a larger diffuse and a smaller dense; typical form a double pear; fission usually by two diverging buds. Includes *P. bigeminum* Smith and Kilborne (Cattle); *P. canis* Piana and Galli-Valerio (Dog); *P. pitheci* Ross (Cercopithecus monkey); ? *P. avicularis* Wenyon (*Avicularis zebrae*); ? *P. leporis* Schunkowski and Luhs (Hare); *P. caballi* Nuttall (Horse); *P. trautmanni* Knuth and Du Toit (Pig).

Genus 2.—*Nicollia* Nuttall, 1908. Defined as oval or pear-shaped parasites with two nuclei and quadripartite clover-leaf fission. Includes *Nicollia quadrigemina* Nicolle (Gondi).

Genus 3.—*Nuttallia* França, 1909. Defined as oval or pear-shaped parasites; quadripartite cruciform fission without any rod-shaped elements. Includes *N. equi* Laveran (Horse); *N.* sp. Denier 1907 (*Cervus aristotelis*); *N. herpestidis* França (*Herpestes ichneumon*); *N.* sp. Patton 1909 (*Herpestes mungo*); *N. ninensis* Yakimoff = *N. weissi* G. Valerio (Common hedgehog); *N.* sp. Schunkowsky and Luhs, 1909 (Sheep in Transcaucasia); *N. asini* Schunkowsky and Luhs (Ass); *N.* sp. Schunkowsky and Luhs, 1913 (Horse in Transcaucasia); *N. muris* Coles (*Microtus incertus*); *N. microti* Coles (*Microtus amphibius*).

Genus 4.—*Smithia* França, 1909. Parasites developing as pear-shaped bodies, mostly filling the whole breadth of the red blood-cell and not dividing into pairs; quadripartite cross-wise fission. Includes *Smithia microti* França (*Microtus incertus*); *Smithia talpae* Galli-Valerio (European mole).

Genus 5.—*Rossiella* Nuttall, 1912. Large roundish parasites, single, double, or in fours in the red blood-cell; nucleus large and round; bipartite fission. Includes *Rossiella rossi* Nuttall (*Canis adnotus*).

Genus 6.—*Gonderia*, nov. gen. Small round or rod-shaped parasites, with quadripartite cruciform fission, the products of fission consisting mainly of chromatin. Includes *Gonderia mutans* Theiler (Cattle); ? *G. dama* Bettencourt, França and Borges (Fallow deer); *G. hirci* Schunkowsky and Luhs (Goat); *G. cellii* Castellani and Chalmers (*Macacus pileatus*); *G. hippotragi* Todd and Wolbach (Equine antelope); *G. buffeli* Neveu-Lemaire (Buffalo); ? *G. stordii* França (Grant's gazelle); *G. brimonti* Leger and Monzels (Three-toed sloth); *G. camelensis* Yakimoff and Schokhor (Camel); and also n. spp. described by Bettencourt and Borges, in 1909, from a duikerbok; by Kerzelli, in 1909, from the reindeer; by Carpano, in 1913, from a gazelle; and by Rodhain, in 1916, from sheep in the Congo.

Family II.—Theileridae. Endoglobular blood-parasites transmitted by Ixodine ticks, without pigment, and multiplying in the vertebrate host mainly by schizogony within the tissue-cells.

Genus 1.—*Theileria* Bettencourt, França, and Borges, 1907. Small round or rod-shaped parasites multiplying by bipartite fission and by schizogony in the cells of the lymphatic system. Includes *T. parva* Theiler (Cattle); *T. annulata* Schunkowsky (Cattle); *T. ovis* Littlewood (Sheep); *T. tachyglossi* Priestley (*Tachyglossus aculeatus*); and a species found by Lichtenheld, in 1911, in the eland.

Genus 2.—*Rangelia* Carini and Maciel, 1914. Round, oval, or pear-shaped parasites, multiplying by bipartite fission and by schizogony within the cells of connective-tissue and endothelium. Includes *Rangelia vitalii* Rangel Pestana (Dog).

? Genus 3.—*Elleipsisoma* França, 1912. Elliptical or oval, pigmentless, endoglobular parasites having a destructive effect on the red blood-cells. The relatively large nucleus usually lies near the edge of the cytoplasm. Schizogony and bipartite fission in the lung. Includes *E. thomsoni* França (Mole).

Paraplasma Seidelin 1912 and *Achromaticus* Dionisi 1900 are not included in this system, the author being disposed to agree with those authorities who renounce *Paraplasma* as a definitely pathogenic entity, and with those who regard *Achromaticus* as something intermediate between the Piroplasmata and the Plasmodia.

A. A.

Brumpt (E.). **Les piroplasmes de bovidés et leurs hôtes vecteurs.**—*Bull. Soc. Path. Exot.* 1920. June 9. Vol. 13. No. 6. pp. 416–460. With 12 text figs.

This is a comprehensive critical review of the piroplasmosis of cattle. The author recognizes 7 species of piroplasms and 2 of anaplasms. The specific differentiae emphasized are of biological and particularly of pathological kind. All the different species that have been investigated experimentally are, with the exception of *Theileria parva*, inoculable on untouched (*neuf*) animals ; for in the author's experience a specific re-infection is impossible, the parasites of the original infection persisting in the blood for many years after recovery, *Theileria parva* excepted. A standard of specific validity is therefore afforded by the test of natural immunity—if an animal cured of a piroplasmosis react to the bite of a tick having a given pure infection this last infection is specifically distinct from the first. Good specific characters are also manifested by the pathological phenomena of infection, *e.g.*, degree of febrile reaction, haemoglobinuria, anaemia, jaundice, etc. ; also by accessory biological facts of association, such as the specific status of the intermediary arthropod host (tick), and the developmental stages at which that host acquires infection and becomes infective, respectively.

The following species are recognized by the author, and are severally described, figured, and discussed in respect of their mode of transmission, pathogenic effects, geographical distribution, etc.

Piroplasma bovis Babes 1888, *pro parte* (= *P. divergens* McFadyean and Stockman 1911, *nec Microbabesia divergens* Sohns 1918). Parasites generally abundant in the blood, in intense infections 20 to 40 per cent. of the red cells may be occupied : they often lie on the surface of the red cell, which is not altered in size : the forms observed are pears, slender double-pears diverging at an extremely open angle, rings, trefoils not seldom, and occasionally anaplasma-like young forms : the largest may be $1\frac{1}{2}\mu$ and rarely exceed 2μ. This parasite occurs over Europe. The normal carrier is *Ixodes ricinus*, the infection usually being acquired by the adult female and transmitted to and by the larvae, but may be acquired by the larva and transmitted by the nymph. Stockman succeeded in transmitting what may have been this species by nymphs of *Haemaphysalis punctata* infected as larvae.

P. argentinum Lignières 1901, 1903. Differs from the preceding in being always rare in the peripheral blood and never superficially placed in the red cell. The infected red cells are often very small. The parasite occurs in South America and perhaps in Netherlands India. A demonstrated carrier is *Margaropus* (*Boophilus*) *australis*.

P. bigeminum Smith and Kilborne 1893. This, the large parasite of Texas fever, occurs probably all over the globe, commonly associated with *Theileria mutans* and *Anaplasma marginale* or other species of piroplasms. (The author, while giving due acknowledgment to the fundamental importance of Sir Patrick Manson's great discovery of 1879, points out that the honour of demonstrating the necessary part played by an arthropod in the propagation of a *protozoal* disease belongs

to Messrs. SMITH and KILBORNE.) The parasites, which are easily found in the peripheral blood in haemoglobinuric cases, may have the form of rings or ovoids, but their characteristic shape is that of double pears converging at an acute angle and having a deeply staining granule at their meeting-point. The rings are from 2 to 3μ in diameter; the ovoids and pears attain a length of 4μ. The carrier-arthropods are the species of Margaropus (= Boophilus), the adult tick acquiring the infection and transmitting it to its offspring. Larvae thus inherently infective when fed on refractory animals (sheep, horse, etc.) become cleansed of their infection, though THEILER records a case of infective larvae issuing from ticks collected from a horse. Attempts to infect other kinds of ticks have generally been unsuccessful, though THEILER once gathered nymphs of *Rhipicephalus appendiculatus* from an infected heifer which were infective, and on another occasion obtained infective larvae from adults of *R. appendiculatus* removed from an infected heifer. KNUTH also traced a suspiciously similar infection directly to *Haemaphysalis punctata*.

Piroplasms of rupture of the spleen:—A suddenly fatal form of piroplasmosis characterised by rupture of the spleen occurs in certain tracts bordering on the North Sea and Baltic littoral. The cases are usually single in a herd and occur only in pastures, and in spring or the beginning of summer, generally in open unwooded country very commodious for *Haemaphysalis punctata*. Though some authorities are satisfied with the evidence criminating either *P. bovis* or *P. bigeminum*, the author gives reasons for suspecting the existence of a distinct local species of Piroplasma in these explosions.

Theileria parva Theiler 1904 (= *Piroplasma annulatum* Dschunkowsky and Luhs 1904 *pro parte*; = *P. rochi* Lignières 1905). Parasite of Rhodesian red-water. The parasites, which do not appear in the peripheral blood until several days after pathological phenomena are manifest, have the shape of small rods, rings, bacilliform and cruciform bodies composed of a chromatoid mass and a much smaller amount of cytoplasm. They are very abundant in the peripheral blood: in acute cases 80 to 90 per cent. of the red cells may be infected, and often as many as 5 to 8 parasites infest a single cell. "Blue corpuscles," products of schizogony, also are found in abundance in the superficial lymphatic glands, spleen, and renal infarcts. First discovered on the east coast, it has since been observed in many other parts of Africa (but not in the Belgian Congo or West Africa) and also in Transcaucasia, Macedonia and India. The carrier-tick is commonly *Rhipicephalus appendiculatus*, by nymph or by adult infected in the respectively antecedent stage, not by heritably-infected larvae; other similar carriers are *R. evertsi* and *simus*. In places where these species do not exist, other species of Rhipicephalus and perhaps *Hyalomma egyptium* are suspect. *Theileria parva* is generally associated with *Piroplasma bigeminum*, *Theileria mutans*, and *Anaplasma marginale*.

Theileria mutans Theiler 1906 (=*Theileria* sp. Dodd 1910; *Piroplasma annulatum* Carpano 1915, *nec* Dschunkowsky 1904; *Theileria parva* Cardamatis, Velu). The parasites though abundant in the peripheral blood are not so amazingly so as *T. parva*; their cytoplasm is sometimes very difficult to detect; the spherical forms are often grouped to form a cross. No schizogony-forms are found in the lymph-glands, spleen, etc. The species occurs all over Africa, in S. Europe, S. Asia, Australia, but not in America. The carrier-ticks are *Rhipicephalus simus*, *evertsi*, and less commonly *appendiculatus*, as

adults affected in the nymph stage, not by larvae inheriting infection. *R. bursa* and *sanguineus* and *Hyalomma aegyptium* also may be suspected. *T. mutans* may be confusingly associated with *T. parva*, and in some parts of Africa is constantly associated with *Piroplasma bigeminum* and *Anaplasma marginale*.

Anaplasma marginale Theiler 1910 (?=*A. argentinum* Lignières 1914 ; *A. theileri* Cardamatis 1911). Intensely and uniformly staining spheres of chromatin, rarely attaining $\frac{1}{2}\mu$ in diameter, situated at or near the edge of the red cell. In heavy infections 50 per cent. of the red cells may be infected, and from 3 to 5 may be seen in an individual cell. Smith and Kilborne regard these bodies as stages in the evolution of *Piroplasma bigeminum*. The author regards them, with Theiler and Lignières, as specifically inoculable parasites. *A. marginale* occurs in almost general association with *P. bigeminum* and *T. mutans*, and in independent purity at least in the Transvaal, Argentine, and Brazil. The carrier-ticks, according to Theiler's observation, are *Margaropus* (*Boophilus*) *decoloratus* and *Rhipicephalus simus*, by larvae issuing from females taken from infected animals ; but the method of infection requires further study since other authorities have only observed the anaplasma bodies in free animals naturally infected or in animals directly inoculated with infected blood.

Anaplasma centrale Theiler 1911. Differs from the preceding by its position in the infected red cell, and in being hardly pathogenic. According to Theiler an animal immunised to *centrale* may be successfully inoculated with *marginale* blood but the latter infection remains benign. The same author states that the carrier-tick is *Margaropus* (*Boophilus*) *decoloratus* in the larval stage.

Anaplasma argentinum Lignières 1914. Morphologically identical with *A. marginale* and considered by some authorities to appertain to the evolutional cycle of *B. bigeminum*. It is not transmitted by *Margaropus* (*Boophilus*) *australis :* Lignières suspects a species of Amblyomma.

The two following are included in an appendix as rare, or as forms whose pathogenic import is not well defined.

Piroplasma hudsonius bovis Bowhill 1908.—Seclusive, pear-shaped, polygonal, rarely double forms found by Bowhill in the course of an investigation of red-water in British Columbia, and having pathological manifestations of a chronic and relapsing nature with usually a fatal ending after the third relapse. The ticks collected from a cow *post mortem* were named at the time *Dermatocentor reticulatus*, a name which has since been restricted to one of three former components—*D. reticulatus, venustus*, and *occidentalis*.

Achromaticus macfiei França 1918.—Diversified, ring, triangle, spindle, and amoeboid forms found in the Gold Coast by Macfie along with *P. bigeminum* and *T. mutans* in the blood of a dying cow. The taxonomy as well as the pathonomy of this form wants more investigation.

A. A.

Brumpt (E.). **Transmission de la piroplasmose canine française par le *Dermacentor reticulatus*. Embolies parasitaires dans les capillaires de l'encéphale.**—*Bull. Soc. Path. Exot.* 1919. Nov. 12. Vol. 12. No. 9. pp. 651–664. With 4 text figs.

In a general review of the subject of the transmission of canine piroplasmosis the author refers to the work of Lounsbury, of Christophers, and of Nocard and others in France. The first showed that

the infection in South Africa was transmitted by *Haemaphysalis leachii*, the infection in the tick being heritable, but latent in the larval and nymphal stages and maturing only in the adults of the next generation : the second showed that in India it was transmitted by *Rhipicephalus sanguineus*, being heritable in the tick, latent in the larval stage and maturing in the nymphal and adult issue of the females that acquired the infection. The French observers merely remarked on the suggestively frequent occurrence of *Dermatocentor reticulatus* on dogs suffering from piroplasmosis, and testified that the issue of females of this species taken from infected dogs were not infective in the larval stage.

The author suspected *Dermatocentor reticulatus* to be the arthropod carrier of canine piroplasmosis in France on biological grounds, it being the only French tick that exhibits the biological concomitants of infesting dog-kennels in its developmental stages, and being found as an adult parasite of dogs at the season when the first cases of haemoglobinuria occur in those animals.

In the present paper he gives full experimental evidence justifying the following conclusions : (*a*) that in France canine piroplasmosis is effectively transmitted by *adults*, not by larvae or by nymphs, issuing from infected females of *Dermatocentor reticulatus* ; (*b*) that larvae and nymphs of this species when fed on virulent blood do not transmit the infection to any further stage of their development ; (*c*) that in the infected dog the parasites multiply in the capillaries of the brain, and to a less extent in the kidney and bone marrow, not normally in the general circulation ; in the brain they form capillary emboli by their agglutination.

The author observed parasites in the dog's blood—a vigorous animal 10 or 12 months old—on the 7th day after the application of infected ticks. He has not yet determined whether the infection is inherited by both sexes of the tick.

The author's experiments lead to the following among other conclusions :—That the larval and nymphal issue of an infected mother do not lose their inherent infection when they are bred up on refractory hosts : that ticks as adults keep their inherited infection at least 3 months, and probably all their life : that the tick probably inoculates the dog with its beak : that probably the adult issue of an infected mother lose their infective power when they feed on a refractory host or on a dog long recovered, and that it is probably the reason why, though *Dermatocentor reticulatus* is so common, canine piroplasmosis is rather rare in France.

A. A.

Benoit-Bazille (H.). **Note sur une** *Grahamella : Gr. musculi*, **n. sp. trouvée dans le sang de** *Mus musculus*.—*Bull. Soc. Path. Exot.* 1920. June 9. Vol. 13. No. 6. pp. 408–416. With 1 plate.

This paper contains an exhaustive bibliography and historical précis of the subject. The author himself has discovered this new species of Grahamella in two white mice which had been infected experimentally with *Trypanosoma brucei*. Some of the red blood-cells infested with Grahamella were almost completely despoiled of haemoglobin. The author appears to attach some conjectural importance to the fact that the two particular white mice had not been well nurtured in the laboratory, but had been brought from a casual source where, presumably, they would have been exposed to ectoparasites of many kinds.

A. A.

Scott (John W.). **Notes and Experiments on** *Sarcocystis tenella* **Railliet. iii. Is** *Sarcocystis tenella* **an Aberrant Form of One of the Cnidosporidia of Insects?**—*Jl. Parasit.* 1920. June. Vol. 6. No. 4. pp. 157–166.

The author here renounces his earlier belief in the theory that the Sarcosporidia are aberrant forms of Cnidosporidian parasites of the gut of insects. In this instalment he describes a series of experiments which finally show that lambs secluded from free insects from birth [nothing is said about parasitic arthropods, but this omission would not affect this aspect of the argument] can acquire infection with *Sarcocystis tenella*, and that lambs kept closely caged are more certainly infected than lambs exposed in an open (dry) pasture. The positive instalment is promised in another paper.

A. A.

Marullaz (M.). **Sur l'évolution de** *Sarcocystis muris*.—*Ann. Inst. Pasteur.* 1920. Aug. Vol. 34. No. 8. pp. 547–552. With 3 text-figs.

According to the author's observations some of the motile spores ingested by the mouse after reaching epithelial cells of the intestine divide by caryocinesis: the products of division, either free or still enclosed in the epithelial cell, fall into the lumen of the intestine, where they continue to divide, up to the tenth day probably. It is reasonable to argue that a considerable number are defaecated and spread the infection to other mice; and the author, though he has never seen actual cysts as described by L. Nègre, is willing to admit that these defaecated spores may be so regarded.

Others of the spores, after having made their debut in the intestinal epithelial cells, emigrate to the lymph spaces, and ultimately the products of their division by caryocinesis find their way to the liver and spleen. Thence their progeny bore their way into the striped muscles.

The author has never seen anything confirmatory of Crawley's idea of syngamy in the epithelial cells of the intestine.

A. A.

Laveran (A.) & Franchini (G.). *Herpetomonas* **et** *Spirochaeta* **de la Blatte orientale.**—*Bull. Soc. Path. Exot.* 1920. May 12. Vol. 13. No. 5. pp. 331–333.

The authors have already dealt with a Herpetomonas of the cockroach which they found to be pathogenic to mice. In this paper they describe a spirochaete found in all parts of the digestive tube and also in the faeces of the cockroach (*Blatta orientalis*), which is also pathogenic to mice, causing enlargement of spleen and liver.

A. A.

Hegner (Robert W.). **The Effects of Environmental Factors upon the Heritable Characteristics of** *Arcella dentata* **and** *A. polypora*.—*Jl. Experim. Zool.* 1919. Vol. 29. No. 3. pp. 427–441. With 4 text-figs.

This is one of a series of papers describing in detail a careful experimental investigation of the efficacy of selection in establishing heritable variations from a specific type, the species investigated being the two freshwater Foraminiferous Rhizopods named in the title.

The details of the experiments are hardly congruous with the objects of this *Bulletin*, but among conclusions reached by the author are some that are of no less interest to the sanitary reformer than to the biologist.

For instance, the author shows that the offspring of underfed parents produce normal progeny when given an abundance of food; that certain experimental changes in the environment could cause distinct variations, which however persisted only so long as the modifying factors were operative; that no heritable diversities were observed that were due to the changed conditions; that specimens of *Arcella dentata* could grow and proliferate in a medium containing from 0·25 to 1 per cent. of alcohol, but that their offspring exhibited irregularities of shell and a retarded fission rate; and that wild specimens of *Arcella polypora* having certain malformations of shell, produced under laboratory conditions offspring with normal shell.

A. A.

Motais (François). **Nouvel éosinate de methylène.** *Bull. Soc. Path. Exot.* 1920. Mar. 10. Vol. 13. No. 3. pp. 206–208.

Hoescht's medicinal methylene-blue	1·00 gm.
Hoescht's eosine	0·40 gm.
Methyl alcohol	40 cc.
Absolute alcohol	80 cc.
Glycerine	30 cc.
Solution of ammoniacal nitrate of silver (Fontana's fluid)	3 cc.

Dissolve in a flask the methylene-blue and the eosine in the methyl alcohol, add the absolute alcohol, then add the glycerine drop by drop, then pour in the ammoniacal silver nitrate solution. Boil the mixture for 3 or 4 minutes in a water bath, shaking well. When cool filter. *Method of use.*—In a Laveran-Mesnil dish flood the unfixed film with 15 drops of the stain, covering to prevent evaporation, and leave for a minute or more to fix. Turn the film face downwards and add 15 cc. of distilled water to the dish. Shake to mix. Leave for 5, 10 or 15 minutes to stain. Wash.

This stain is said to give results comparable with Romanowsky stains, and of a remarkable intensity.

A. A.

Boyd (J. S. K.). The Staining of Blood Smears for the Malaria Parasite.—*Jl. Roy. Army Med. Corps.* 1920. Oct. Vol. 35. No. 4. pp. 327–329.

It is here argued that, particularly in relapses, the thick-smear method is the quickest for diagnosis. The smear when dry is at once fixed and haemolysed by flooding the slide for ten minutes with a solution of 20 parts formalin and 2 parts glacial acetic acid in 78 parts of distilled water. The smear is then very gently washed in tap-water and stained for at least 2 minutes with either borax-methylene-blue or Löffler's methylene-blue, followed by washing in tap-water and drying by heat.

A. A.

Simon (Sidney K.). The Intestinal Protozoa: Methods of Diagnosis and Treatment.—*Southern Med. Jl.* 1920. Aug. Vol. 13. No. 8. pp. 569–573.

This is a useful essay on the text that microscopic examination of faeces should in all latitudes be an established clinical custom.

A. A.

Dunn (Lawrence H.). **Report on the Mosquitoes Caught by Hand in the Canal Zone from February 1st, 1916, to January 31st, 1917.**—*Proc. Med. Assoc. Isthm. Canal Zone.* 1917. July–Dec. Vol. 10. Part 2. pp. 145–169. With 1 map.

Catching mosquitoes by hand is so cheap and is considered to be so successful in reducing the number of cases of malaria that it is still

a routine practice in the Panama Canal Zone. The hunters are trained negroes, each being provided with a hand-lamp and a killing-tube. The venue includes all kinds of buildings and domiciles, tents, boats, etc., most of the buildings being screened, those not screened being occupied by coloured men. The following figures extracted from a table containing the analysis of the total catch of 12 months may be of interest.

The total catch was 391,019, of which 60,367 were Anopheles, 252,355 Mansonia, 74,095 Culex and allied genera, and 1,494 *Stegomyia fasciata*. Of the 60,367 Anopheles 50,624 were actually identified as *A. albimanus*, and two-thirds of them were caught in the four months May–August. Of the 252,355 Mansonia 251,332 were *M. titillans* and nearly three-eighths of them were caught in the two months August-September.

A. A.

Trinidad & Tobago. **Council Paper No. 89 of 1920. Malaria (Part 1). Report by Dr. C. F. Lassalle, Deputy Surgeon-General, on Anopheles Survey of the Colony of Trinidad and Tobago.**—51 pp. With 6 plans and 1 Sketch Map. Printed at the Government Printing Office, Port of Spain. 1920. [Price 1s. 9d.]

The official record of a good piece of work of lasting value. It contains the individual reports of the District Inspectors and a summary by the administrative officer. The uniform plan of district survey was as follows :—

1. To make a search for all collections of water, including holes in trees, and natural receptacles of plants ; to collect larvae as found therein and breed them out for specific identification.

2. In the case of each proven breeding-place to note, at the moment, its nature and extent, source of the water, use, etc., and the likeliest methods of dealing with it.

3. To note and determine all ground liable to be flooded in the wet season.

4. To make accurate sketch-plans showing breeding-places, distinguished as permanent, temporary, and potential ; villages, estates, settlements, houses, etc. ; and main lines of drainage and roads.

5. To study as far as practicable the habits of adult mosquitoes. To examine houses for mosquitoes and note distance from breeding-places.

6. To keep a diary of operations and summarize it weekly.

7. On completion of the survey to write a connected report of the facts and a general description of the physical features of the district.

A. A.

Swellengrebel (N. H.) & Swellengrebel de Graaf (J. M. H.). [In Dutch & English. **Over de eischen die verschillende Anophelinen stellen aan de woonplaatsen hunner larven.—On the Requirements of Different Anophelines in regard of the Abode of their Larvae.**—*Meded. Burgerlijk. Geneesk. Dienst. in Nederl.-Indië.* 1919. Part 7. pp. 39–85.

Anopheles breeding-grounds in Netherlands India territory are here surveyed in very great detail, the aim being to settle the argument whether, among Anophelines reputed to be dangerous, any species are so strictly adapted to or so persistently concentrated in waters so

particularly distinctive in character as to justify the limitation of preventive measures to waters of that particular character. Such a *specific* preventive policy, if rationally established on fact, would have the merit of economy. The paper is too full of facts of observation to be summarized, but the authors seem to think that of all dangerous species included in their survey *A. ludlowi* is the only one that might justify a *trial* of the specific preventive theory.

A few facts and guarded generalisations from this laborious and meritorious paper may be noticed with advantage.

According to breeding-range the 15 species included are grouped in four categories, namely, Salt-water, Hilly, Ubiquitous, and Shady.

Of the two species in the first group—*A. ludlowi*, and a variety of *A. rossi* having a ludlowi-like larva—neither is quite exclusively salt-water bred, larvae of the former being found not only in fresh water contiguous to salt water that had been rendered unsuitable but also in fish-ponds several miles distant from the coast; while larvae of *rossi* were found in many kinds of fresh water, including running brooks.

Of the breeders in hilly country—*A. maculatus*, *aconitus* typical, *aconitus* variety, and *aitkeni*—only the last two are distinctively hill species, the other two—and more particularly *maculatus*—having a tendency to spread over the neighbouring lowlands. *A. maculatus*, though perhaps having some preference for clear, running water, is not fastidious but adapts itself to many conditions, even to cisterns and to holes and turbid hoof-prints in boggy ground. [The authors observe that *A. karwari*, of which they have only limited data, seems to have the same range and adaptive habit as *maculatus*.] The typical form of *A. aconitus* is not quite so adaptive or so detachable from the vicinity of hills as *maculatus*. The larvae of *A. aitkeni*, distinctively a hill breeder, were found in brooks, springs, irrigation-drains, rice-fields, and swamps in ravines, as well as in pools in virgin forest.

The species grouped as ubiquitous breeders are *A. indefinitus*, *sinensis*, *barbirostris*, *fuliginosus*, *kochi*, *punctulatus*, and *annulipes* var. *moluccensis*. The larvae of *indefinitus* were found in water of almost any kind, from running brooks to the rain in cart-ruts, also in salt water. *A. sinensis* and *barbirostris* were found in water of many kinds and also in salt water; they seem to have some sort of preference for waters thick with vegetation and to avoid muddy water. *A. fuliginosus* is even more particular in its preference for clear water; its larvae were sometimes found in salt water, in company with *ludlowi* and *barbirostris*. *A. kochi*, *punctulatus*, and *annulipes* var. *moluccensis* on the other hand are not in the least fastidious; none of them object to very dirty water and the last two do not mind whether it is fresh, brackish, or salt.

The Shade-loving species are *A. umbrosus*, *albotaeniatus*, and *leucosphyrus*. *A. umbrosus* is the least insistent on shade, and the larvae may sometimes be found in salt water; the larvae of *albotaeniatus* and *leucosphyrus* were found in sluggish brooks and dirty pools in the forest.

In their general remarks the authors note their impression of some objection felt by the larvae of *sinensis* and *barbirostris* to *Pistia stratiotes*, by those of *ludlowi* and *rossi* to duckweed, and by various larvae to *Utricularia*. As regards the action of fish the authors limit themselves to the statement that given plenty of aquatic vegetation the presence of great numbers of notoriously destructive fish, such as *Haplochilus panchax*, is consistent with the presence of a great many larvae.

A. A.

Swellengrebel (N. H.) & Swellengrebel de Graaf (J. M. H.). **List of the Anophelines of the Malay Archipelago with Special Reference to Adults and Larvae of New or Incompletely Described Species or Varieties.**—*Bull. Entom. Res.* 1920. Aug. Vol. 11. Pt. 1. pp. 77–92. With 11 text figs.

The following are among the more noteworthy items of this paper :—

The anopheles described by the authors as *Myzomyia flava* is now found to be identical with *A. immaculatus* Theob. It is diagnosed as a yellow mosquito with orange-coloured unbanded legs, creamy unbanded palpi, brownish-yellow proboscis and unspotted wings having creamy scales. The authors suspect that it may be an albinoid variety of *Anopheles vagus* (= *indefinitus*).

Anopheles (*Myzomyia*) *indefinitus* is probably identical with *A. vagus* Dönitz.

A constant difference between *A. rossi* and *A. vagus* (= *indefinitus*) on the one hand and *A. ludlowi* on the other hand is presented by the two spots situated on the upper branch of the 5th vein, below the cross-veins. In the first two species these spots are short, in the last species they are longer.

Anopheles (*Myzomyia*) *tessellatus* Theob. (probably *A. deceptor* Dönitz) is regarded as a variety of *A. punctulatus* Dönitz.

The authors cannot distinguish between the larvae of *A. ludlowi* and *A. rossi*.

A. A.

Metz (C. W.). **On the Possibilities of using Mosquito Traps in Anti-malaria Work.**—*Public Health Rep.* 1920. Aug. 20. Vol. 35. No. 34. pp. 1974–1977. With 1 plate.

The author argues that in sparsely-inhabited rural areas the local trapping of adult anophelines is a more sensible proposition than the draining or oiling of waters or the screening of houses. A bait which the author has found attractive is a pig : the traps, therefore, besides being suitably devised for admitting mosquitoes and preventing their escape, should be large and strong enough to hold a docile pig ; and they should be judiciously spread, some near, some at a distance from the breeding-waters. The proposal is no doubt sound ; but when the author goes on to suggest as an improved bait some hypothetical chemical quintessence of pig one is inclined to exclaim with Ancient Pistol "*pauca*, there's enough."

A. A.

Edwards (F. W.). **Notes on the Mosquitos of Madagascar, Mauritius and Réunion.**—*Bull. Entom. Res.* 1920. Sept. Vol. 11. Pt. 2. pp. 133–138.

The species of Anopheles here enlisted are *mauritianus, maculipalpis, squamosus* (= *Cellia tananariviensis* Ventrillon), *pharoensis, funestus, marshalli, transvaalensis,* and *costalis.*

A. A.

Zetek (James). **Anopheles Breeding among Water Lettuce.—A New Habitat.**—*Bull. Entom. Res.* 1920. Aug. Vol. 11. Pt. 1. pp. 73–75.

Water-lettuce is *Pistia stratiotes,* the Lemnad whose rootlets harbour the larva of Mansonia (and of Aedeomyia). The author now discovers

that its floating tuft of leaves forms a very sufficient haven, in the waters of the Panama Canal Zone, for the larvae of *A. albimanus* and *A. tarsimaculatus*. He mentions that Ingram and Macfie in West Africa observed larvae of *A. costalis* and *marshalli* sheltering in *Pistia stratiotes*, in 1917.

The observation, as the author remarks, is of importance since Pistia is widely distributed the tropics, is abundant, and travels freely by means of wind and current. Special measures are therefore necessary either to clear it off or to destroy its mosquito fauna—ordinary procedure is not enough.

A. A.

Howard (L. O.). **Mosquitoes and Bats.**—*Public Health Rep.* 1920. July 30. Vol. 35. No. 31. pp. 1789–1795.

In the battle against mosquitoes many people have adventured bats —" batteries," as one profane writer expresses it, of these fearful wild-fowl. Some have even set up " bat-roosts," with the intention of getting mosquitoes converted into manure by interposition of Chiroptera. The author has gone into the matter carefully : on the one hand he gives us the affirmations of Mexican residents concerning the disappearance of malaria in the vicinity of bat-roosts ; on the other hand the reports of experts who in a series of examinations of the contents of bats' stomachs could not recognize any remains of mosquitoes : and he sums up that more of experiment is necessary.

A. A.

Edwards (F. W.). **Mosquito Notes.**—*Bull. Entom. Res.* 1920. Jan. Vol. 10. Part 2. pp. 129–137. With 1 text fig.

Among the notable contents of this paper is an attempt, which must be stigmatized as arbitrary, to do away with settled names of common species of Anopheles. The names here consigned to Lethe are *Anopheles sinensis* Wiedemann and *Anopheles rossii* Giles, the former of which is assumed to be synonymous with " *Culex* " *hyrcanus* of Pallas, and the latter to be synonymous with *Anopheles subpictus* of Grassi.

Pallas's description of " *Culex* " *hyrcanus* certainly contains a misprint as well as some defects of style and grammar that may not be ascribed entirely to the printer. The insect is stated to be grey with a darkish abdomen ; to have antennae of three segments, subpennate at base and three-noded at tip ; to have no palps, and a proboscis hairy at base and somewhat thickened at tip ; to have very long, grey, and conspicuously hirsute legs ; and to have greyish wings, with hirsute veins at the thicker edge, spotted black, smooth above and with hirsute veins below. As this obscure description of *hyrcanus* does not fit the species known as *Anopheles sinensis* there is no justification for substituting the name *hyrcanus* for *sinensis* whether or not Mr. Edwards' assumption that the North Caspian insect described by Pallas is " unlikely " to have been anything else than " *sinensis* " be reasonable or not :

" ἐς ἀφανὲς τὸν μῦθον ἀνενείκας οὐκ ἔχει ἔλεγχον." *

Whether or not *Anopheles rossii* of Giles be a synonym of *A. subpictus* of Grassi is a question that can be decided without further argument if—as Brunetti in his Catalogue of Oriental Nematocera states to be the case—the type specimen of *A. subpictus* still exists in Rome.

* [If you take your argument into unknown territory, it has not much persuasion.—Ed.]

Mr. Edwards' argument that the synonomy is settled by the fact that the said very insufficiently described type came from Calcutta suffers disparagement from the fact that *A. rossii* is not the only species of the Myzomia section that exists in Calcutta.

A. A.

Blacklock (B.) & Carter (Henry F.). **On the Results obtained from Surveys for Breeding-Places of Tree-Hole Mosquitoes in Liverpool and Neighbourhood.**—*Ann. Trop. Med. & Parasit.* 1920. June 30. Vol. 14. No. 1. pp. 115–126. With 1 plate & 1 text fig.

2,500 trees were examined up to a height of 25 feet, and 83 holes and 51 forks and clefts containing water were found. 16 breeding-places of *Anopheles plumbeus* and 19 of *Ochlerotatus geniculatus* were discovered, the two species being associated in 13 cases. Most of these breeding-places were at heights above 6 feet, and in elms, horse-chestnuts, and sycamores. The authors describe and figure an ingenious and efficient apparatus for siphoning off the water from openings too small or too deep for spoons or ladles.

A. A.

Talbot (George). **Observations on Mosquitoes at Sandwich during the Years** 1918–19.—*Jl. Roy. Army Med. Corps.* 1920. Aug. Vol. 35. No. 2. pp. 167–175. With 2 charts in text.

Of a many miscellaneous observations the following may be noted : hibernating larvae of Anopheles (presumed to be *bifurcatus*) differed from the growing larvae in the absence of food from the gastric caeca. Frozen larvae did not always recover. No conclusive evidence was obtained that wintering *Anopheles maculipennis* were " hibernating " in the sense of being inactive. The clypeal hairs of Anopheles larvae (presumably *bifurcatus*) taken between the end of September and the middle of January showed considerable variation. *Anopheles maculipennis* showed feminine caprice in feeding.

A. A.

Martini (E.). **Ueber Stechmücken, besonders deren europäische Arten und ihre Bekämpfung. Veröffentlicht mit Unterstützung der Hamburgischen wissenschaftlichen Stiftung.** [On Mosquitoes, especially the European Species, and how to control them. Published by the Aid of the Hamburgische wissenschaftliche Stiftung.]—*Beihefte Arch. f. Schiffs- u. Trop.-Hyg.* 1920. Aug. Vol. 24. No. 1. pp. 1–267. With 117 figs. in text and 4 plates.

This comprehensive treatise contains not only a general account of the anatomy, natural history, oecology, and pathonomy of mosquitoes, and a very particular account of the European species and their individual bionomy, but also an extensive review of the general principles of anti-mosquito sanitation as well as a full exposition of their practical application. Though it includes in its scope things so diverse as studied descriptions of new species of *Culicidae* and diagrams of drainage-technique all the miscellaneous detail is very clear and explicit.

A. A.

Martini (E.). **Mitteilungen ueber Stechmücken.** [Notes on Mosquitoes.] —*Arch. f. Schiffs- u. Trop.-Hyg.* 1920. June. Vol. 24. No. 6. pp. 177–178.

Desultory remarks on various mosquitoes, *e.g.*, that in the country round about Hamburg *Anopheles maculipennis* is found in houses more

often in spring than in summer ; that certain species object to thymol little or not at all ; that *Culex pipiens* is repelled by citronella, but *C. nemorosus* is not ; that *C. pipiens* has predilections when given a choice of a host [Miss Nelly Evans noticed the same thing with *C. fatigans* in Calcutta] ; and that *C. pipiens* and the local Anopheles will feed on bad blood.

A. A.

Marchand (Werner). **First Account of a Thermotropism in *Anopheles punctipennis*, with Bionomic Observations.**—*Studies from the Rockefeller Institute for Medical Research.* Reprints. 1920. Vol. 33. pp. 581-517. With 2 figs. in text. [Reprinted from *Psyche*, 1918. Dec. pp. 130–135.]

The author states that larvae of *Anopheles punctipennis* are best reared in shallow dishes regularly supplied with unicellular surface-algae ; no other aquatic vegetation is necessary to keep the water sweet. Adults are specially attracted to nutriment spread on a warmed surface ; and even if a filter-paper be warmed, without being baited, they go for it : in the language satirized of old by the comic Muse " the biting instinct is due to a thermotropic reaction."

A. A.

MacGregor (Malcolm E.). **Locality Differences in the Feeding Habits of Mosquitoes.**—*Jl. Trop. Med. & Hyg.* 1920. Spt. 15. Vol. 23. No. 18. pp. 226–227.

The author remarks upon irregular appetites in mosquitoes and on the fallibility of estimates of character formed only on observations made in one part of the range of any given species. Thus *Theobaldia annulata*, which in Wisley would not bite, and in Sandwich could not at any time of year be got to bite him, has quite exhausted his patience at Woking. Again, *Culex pipiens* has not got at all a bad reputation in many places, but men working in the Underground at Highgate have had to appeal for protection against its vicious onslaughts. Or again, *Anopheles maculipennis*, which at Bordon was the author's perfectly harmless consort, behaved itself at Wisley in a manner that quite compensated for the indifference of *Theobaldia annulata* there.

A. A.

Roubaud (E.). **Emploi du trioxyméthylène en poudre pour la destruction des larves d'Anophèles.**—*C.R. Acad. Sci.* 1920. June 21. Vol. 170. No. 25. pp. 1521–1522.

Petroleum and other larvicides commonly used in anti-malarial operations being noxious to fish, repugnant to cattle, and unpleasant to man, the author recommends finely powdered commercial paraform as a superior substitute, stating that it is exclusively fatal to anopheline larvae—as specifically so as quinine to malaria parasites.

In calm weather the powder—either pure, or mixed with a third part of flour or chalk—is to be blown on the water in a light cloud ; in windy weather it is to be intimately mixed with 9 parts of sand or grit, and scattered by hand. For one square metre of surface 0·25 gm. of paraform is enough.

A. A.

Caballero (A.). **La destruction des larves de moustiques dans l'eau renfermant des** *Chara foetida.*]—*Bol. R. Soc. Española Hist. Nat.* 1919. Oct. Vol. 19. No. 8. p. 449. [Summarised in *Bull. Office Intern. d'Hyg. Publique.* 1920. Mar. Vol. 12. No. 3. p. 285.]

The author having observed that eggs of mosquitoes were not deposited, nor larvae found, in jars containing *Chara foetida,* made some exact experiments on this observation, and found that eggs, or larvae, or pupae, of *Stegomyia culex* and *Anopheles* placed in aquaria containing Chara always died sooner or later.

The author infers, from the iridescent, greasy scum formed on the surface of the water, that Chara gives off something that has the same fatal action on the larvae as petroleum.

[C. W. Metz has observed that water containing Chara is unsuitable for rearing Anopheles larvae. See this *Bulletin.* Vol. 15. p. 153.]

A. A.

Howard (H. H.). **Report No. 7486 of the International Health Board on Use of Top Minnow** (*Gambusia affinis*) **as an Agent in Mosquito Control.** viii+59 pp. With 18 figs. in text. 1920. Jan. 3. New York: International Health Board, 61, Broadway. [Lithographic Report for limited circulation.]

[*Gambusia affinis* is one of the *Cyprinodontidae,* a family of small mainly carnivorous and viviparous fishes of adaptable habit represented all round the globe in warm latitudes.]

The author has investigated the efficacy of this species for the sanitary control of mosquito larvae in an agricultural tract about 36 square miles in extent in the hills of Mississippi. The investigations here recorded deal mainly with small cattle-ponds ranging in individual perimeter from 53 to 110 yards, a mill-pond with a perimeter of 336 yards, a fish-pond of 720 yards perimeter, sections of two small creeks, a chain of borrow-pits, and several water-holes a few feet in diameter. The author's observations and experiments show for waters of this sort that where Gambusia is present, and cannot escape, and is not disturbed by enemies or hindered in its predatory activities by water-weed and other cover, there mosquito larvae are not to be found. They also show, for waters of this sort, that where Gambusia is not and mosquito larvae are present, then the clearing and edging of the water, and the introduction of a few individuals of Gambusia of both sexes, will soon be followed by the disappearance of mosquito larvae. They further show that if in a pond containing Gambusia and free from mosquito larvae the fish manage to escape to any extent, or are disturbed by enemies, or are baulked by increase of floating vegetation, etc., or by overflow of the water into grassy shallows, there mosquito larvae will presently make their appearance, but will disappear again when the conditions unfavourable to the fish are removed.

Thus the facts recorded in the paper form another good demonstration of the proposition that surface-feeding fishes, and particularly those prolific species of the family to which Gambusia belongs, are a most effective natural check to the unlimited increase of mosquitoes, and can also be employed to control mosquitoes under certain artificial conditions.

A. A.

Radcliffe (L.). **Fishes Destructive to the Eggs and Larvae of Mosquitoes.**—*Dept. Commerce, Bur. Fish., Washington, D.C. Economic Circular No.* 17. 1915. July 1. 19 pp., with 28 figs. [Summarized in *Rev. Applied Entom.* Series B. 1920. Aug.]

A list of 26 species of fishes –namely 15 Cyprinodontids, 8 Centrarchids, 2 Cyprinids, and an Atherinid—considered suitable for use against eggs and larvae of mosquitoes in the United States.

A. A.

i. Osterwald (Hans) & Tänzer (Ernst). Ein Jahr Anophelenbeobachtung.—*Cent. f. Bakt.* 1 Abt. Orig. 1920. Sept. 27. Vol. 85. No. 1. pp. 42–46.

ii. Peacock (A. D.). The Anopheline Waters of Southern Flanders. Being a Report on the Area occupied by the British Second Army in France.—*Parasitology.* 1920. Vol. 12. No. 3. pp. 234–252. With 1 map and 1 text-fig.

iii. Lamoureux. Moustiquaire de campagne pour homme couché.—*Ann. de Méd. et de Pharm. Colon.* Paris, 1920. (Numéro exceptionnel.) pp. 89–91.

i. The observations on *Anopheles maculipennis* and *bifurcatus* here recorded contain nothing novel.

ii. Much detail of local interest. The only larvae found were *A. maculipennis.*

iii. Description, without figures, of a mosquito-net for camp use.

A. A.

Fielding (J. W.). **Notes on the Bionomics of** *Stegomyia fasciata*, **Fabr. (Part I.).**—*Ann. Trop. Med. & Parasit.* 1919. Dec. 10. Vol. 13. No. 3. pp. 259–296. With 1 chart in text.

These notes, though they follow the lines of Bacot's similar investigations, and mainly confirm the observations of other workers, contain some interesting novel matter. The author confirms the fact that *Stegomyia fasciata* can produce eggs only on a diet of blood: experimenting with numerous other kinds of food he found that the only artificial diet that might serve instead of blood was a concentrated mixture of peptone and syrup. Unfertilized females fed on blood will lay eggs, but with nothing like the opulence shown after fecundation. The average yield of eggs from a single fertilized female was 750, deposited in the course of 40 to 70 days.

Females in a state of nature were found by the author to deposit their eggs impartially in almost anything containing water; but in a state of captivity they deposited more freely on water containing organic matter than on tap-water. Eggs may be laid on a mixture containing as much as 70 per cent. of sea-water. The author confirms the general belief that either water or a damp surface is essential to ovipartion.

Eggs hatched during the 2nd and 3rd day in summer, and a day later in winter: a certain proportion of eggs do not hatch until after a subsequent immersion, which may extend to 4½ months. Such "resistant" eggs may be brought to hatch by a sudden reduction of temperature, as noted by Bacot, and also by brief contact with lysol or with 2½ per cent. soap solution. Dried eggs were found to hatch almost as freely in sea-water as in tap-water. Fresh eggs hatched in a mixture containing 80 per cent. sea-water, but the subsequent ontogeny of the larvae was uncertain in a mixture containing as much as 40 per cent. Eggs hatch as freely in a photographic dark room as in direct sunlight and the larvae can complete their ontogeny in the dark room.

The author confirms the observations often made that larvae and pupae removed from water for a day or two can complete their ontogeny when returned to water. In his experiments one pupa allowed to dry was found to be alive at the end of 47 hours, but died

when returned to water. [No experiments were made to determine what might happen to pupae simply left high and dry. At the London School of Tropical Medicine, last summer, some pupae left on the floor of a cage hatched after some delay, to my infinite surprise, the issued adults being quite healthy and active.]

A. A.

Macfie (J. W. S.). **Heat and *Stegomyia fasciata* : Short Exposures to Raised Temperatures.**—*Ann. Trop. Med. & Parasit.* 1920. June 30. Vol. 14. No. 1. pp. 73–82.

The experimental observations here recorded were designed to test the resistance of *Stegomyia fasciata* to sudden exposure to raised temperature for a term of five minutes. They show that for eggs 49° C. is ultimately fatal, for larvae 44° C., for pupae 46° C., and for adults 44° C.

A. A.

Fiske (W. F.). **Investigations into the Bionomics of *Glossina palpalis*.**—*Bull. Entom. Res.* 1920. May. Vol. 10. Part 4. pp. 347–463. With 6 text-figs. and 5 folding charts.

These investigations of the inter-relations of *Glossina palpalis* with its environment were made on some shores and adjacent islands of Lake Victoria which had been depopulated some years before as a sanitary expedient.

In a general introduction it is stated that the original aim was to attain such a precise and final knowledge of the bionomy of the species as would surely point the way to its complete extermination from the territory in question. An incidental observation, however, disclosed a stretch of shore where fly and unsuspected fishermen were found in concomitance without any procurable evidence of co-existent sleeping-sickness, and further inquiries having revealed a similar equilibrium in three of the lake ports, the author now concludes that a more restricted investigation of this equilibrium and of the particular conditions upon which it depends is sufficient for practical purposes. The argument perhaps demands a larger faith in the infallibility of academic prescience and in the applicability of *a priori* reasoning to field work than common experience justifies.

The actual report contains an immense amount of matter the practical value of which the author himself, perhaps " thinking too precisely on the event," appears rather to disparage. Being a summary and analysis of a great mass of observation and argument set down a good deal in theorem fashion it cannot be further summarized, but must be followed and pondered in the original. Here we can merely extract some of the conclusions demonstrated or conjectured.

The first three sections deal with the ratio of the sexes, the variable behaviour towards man and domestic animals, and the " long shore movements " of *Glossina palpalis*. The author's conclusions are that there is no wonderful disparity of numbers between the sexes, and that the frequently observed excess of males in field captures is due to the constant activity of that sex in contrast with the females, who are active only when hungry and may indeed, when on the move, be relatively abundant at particular spots where the shelter is too poor (reeds) to satisfy the males. The author feels justified in concluding further (1) that in any given locality a low percentage of observed

females implies abundance of natural hosts and comparative exemption for man, and conversely a high female percentage implies paucity of natural hosts and danger for man, and (2) that a certain type of vegetation is a useful index of the local attractiveness for fly. Observations *ad hoc* afforded actual evidence that the expulsion of delectable natural hosts (Crocodile and Varamus lizard) from given islets was almost immediately followed by sustained attack on man and domestic animals.

The two following sections relate to the assembling and swarming habits of *G. palpalis* and to the influence of open waters and humid conditions. On delectable hosts the flies were observed to swarm so that when disturbed they hummed like angry bees. Flies are also strangely attracted by an open umbrella of dark hue, but they do not linger on it in a swarm. As regards humidity, the author concludes that it is only a necessary accident of the habitat, the proper concomitance of food, shelter, and breeding-grounds occurring only in humid riparian tracts—the point is not easy to appreciate.

In the next section the natural hosts and the predilections of *G. palpalis* are very fully considered. Among hosts the ubiquitous crocodile comes first (provided, of course, that it exposes itself where there is shelter for the fly) and the common Varanus lizard is a good second. Third in local importance is the Situtunga antelope, which on inhabited islands free from leopards should in the author's opinion be ranked as vermin. Next comes hippopotamus, which not only nourish the fly directly, but also render indirect service by opening out grazing-grounds for situtunga and bush buck. Among minor hosts bush buck and bush pig are mentioned. Buffalo, although said to be increasing, are not thought to be important, as they are not constant enough to water. A long list of other possible hosts is discussed. Particulars of experiments and of observations under natural conditions made to estimate the comparative attractiveness of some of the hosts are given. It is noted that fly appeared to avoid the common Cercopithecus monkey, and also that no evidence could be obtained that the abundant birds of the shore were of any use as hosts. Experiments showed that the goat was remarkably unattractive to fly. [Remembering how feral goats exterminated the indigenous flora and thereby pauperized the endemic fauna of the tropical island of St. Helena, this evidence of the unalluring quality of the goat suggests a big-scale trial of this hardy animal on one of the tsetse haunted islands of L. Victoria.]

The next two sections, which are largely ratiocinative, deal with breeding-grounds and with the shelter required by *G. palpalis*. The breeding-grounds, which of course must be in propinquity to shelter and a constant food-supply, are most frequently in clean, dry, sandy or gravel beach where low shrubs, herbaceous plants, logs, stumps, rocks, etc., afford a light and airy shade. Less often they are in fine, dry, unrotted vegetable debris shaded by overhanging rock or fern. Occasionally they occur on old beach-lines some distance—in one observed instance 1,100 yards—from the existent water-mark. The shelter required by the pupae is thus quite different from the thick forest shelter necessary for the adult fly, and the author concludes that although lightly sheltered areas may be ideally good hunting and breeding grounds for fly they will not be found actually infested unless they lie within easy access of massive shelter. At certain spots colonies of fly were found in sheltered reaches behind banks of sudd inside which the ground had become almost marsh-like.

The next section treats very copiously of inimical factors of all kinds in the environment of *G. palpalis*. Though all these factors are very carefully analysed, severally and generally, the author adopts the reasonable argument that the continued existence of a species implies that within its range it is superior to all inimical influences. Academically then the inquiry may be interesting, but practically it is simpler to study and grasp the large factors that contribute to the protection of a species than to attempt to unravel and to manipulate independently all the multifarious destructive agencies. Among inimical factors of an indirect kind the author discusses the antagonistic influence of leopards and of competing blood-sucking flies such as Tabanus.

The penultimate section is also largely speculative. Here after reiterating the three-fold specific requirement of *G. palpalis*—vertebrate blood, good shelter, and breeding-grounds of a particular character—the author reviews the natural circumstances which in the locality under consideration influence the range and density of the species, circumstances with which man can deliberately interfere. In the author's opinion direct attempts to destroy the fly are useless, attempts to oust it by destroying its natural hosts are inadvisable or even dangerous, and the most reasonable proposition is to reduce its numbers to a safe minimum by depriving it of protection by well planned clearing. What this safe minimum may be has still to be decided, and, as the author recognizes in his introductory remarks, is not an entomological problem.

Finally the author discusses the effect upon *Glossina palpalis* of fluctuations in the level of the lake. A comparison of two fly-surveys of a particular tract of shore made at an interval of 9 years shows a remarkable increase of fly coincident with a falling level of the lake. From this and other considerations the author concludes that a fluctuating level brings about conditions favourable to the fly. His explanation is that rising waters clear away the cumber of vegetation and wash the breeding-grounds clean, while falling waters lay bare clean stretches which as fresh shelter grows form good breeding-grounds; a constant level would choke breeding-grounds under accumulated deposits of humus.

A. A.

Jack (Rupert W.). **Some Notes and Remarks on the Bionomics of *Glossina morsitans*.—*Bull. Entom. Res.* 1920. Sept. Vol. 11. Pt. 2. pp. 113–132. With 2 sketch plans in text.**

The author after some preliminary discussion diffidently enunciates the following propositions for further investigation :—

" (1) The latter part of the dry season is probably, in general, the most favourable portion of the year to the fly.

" (2) The later the onset of the rains the greater the capacity for increase.

" (3) Seasons of unusually heavy rainfall are inimical, at least in certain areas.

" (4) A series of years of low rainfall is favourable.

" (5) Regions where the fly commonly attains the greatest concentration of numbers are the regions where it is most liable to be reduced or to die out, namely, parts of the infested areas where first-grade foci predominate.

" (6) In Southern Rhodesia the passage of grass fires has, as a rule, no appreciable effect on the numbers of the fly.

" (7) Mopani belts are probably of considerable value to the fly in providing limited areas attractive to game in the wet season, where the grass remains short; they possibly also afford a convenient refuge from grass fires in the dry season.

" (8) The fly does not migrate under the stimulus of hunger or in company with game.

" (9) The fly as a whole does not follow game about infested areas.
" (10) The maximum distance at which a hungry fly readily detects its hosts is a short one, possibly less than 100 yards.
" (11) The maximum following distance of the females remains to be determined ; the writer is not yet convinced that the females seek animals and human beings only for the purpose of feeding, though this appears probable."

A. A.

Lamborn (W. A.). **Some Further Notes on the Tsetse-Flies of Nyasaland.**—*Bull. Entom. Res.* 1920. Sept. Vol. 11. Part 2. pp. 101–104.

The author records some observations suggestive of the efficacy of *Mutilla glossinae* as a check on *Glossina morsitans:* in a district where the Mutilla had previously been active the fly had diminished in numbers (without any decrease of game) and puparia were hard to discover : in another district about 40 miles north where the fly was abundant evidence of the Mutilla could not be found.

As regards *G. brevipalpis,* the author's observations in this locality are that (though crepuscular) it is not nocturnal, nor is it attracted to lights. He describes the native's methods of catching this fly when it is settled on their body : the blade of a knife or spear is laid nearly flat on the skin and then is slid along until the edge can be pressed down over the fly's legs, the fly being heedless of danger from below. As an illustration of the elusive disposition of this species the author relates that in a tract where only three flies were seen by day (though many were captured at dusk) thousands of puparia were collected in a few days.

As regards control of tsetse-flies, the author sums up a judicious argument in favour of cultivating and distributing extensively the endoparasites (Bombyliid, Mutillid, and particularly Chalcidid) not only of the species of Glossina generally, but also of other Muscids native to the Ethiopian region.

A. A.

Shircore (J. O.). **Measures against** *Glossina palpalis.*] [Correspondence]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1920. June 18. Vol. 14. No. 2. p. 30.

With reference to the decoys for pupae of *Glossina palpalis* advocated by Dr. G. H. Carpenter (see this *Bulletin,* Vol. 16, p. 107), the present author suggests that logs in the vicinity of these decoy-grounds should be limed so that the parturient flies would be caught. He furthermore suggests making assurance doubly sure by mixing some suitable poison with the soil of the decoy-ground.

A. A.

Zupitza (M.). **Ein Weg zu erfolgversprechender Bekämpfung der Schlafkrankheitsfliege am Tanganika.** [A Likely Way of Controlling the Sleeping Sickness Fly on Tanganyika.]—*Arch. f. Schiffs-u. Trop.-Hyg.* 1920. June. Vol. 24. No. 6. pp. 161–166.

A discursive paper containing much topographical detail but no map where it can be followed. The principle recognized by the author is modification of the environment. For instance he describes at the north-eastern end of Lake Tanganyika extensive tracts of swampy ground where tsetse-flies luxuriate : in the dry season these tracts are separated from the Rusisi river by low banks of shingle though they are not below the river level. It is inferred that a cut through

this shingle would adversely affect these haunts of the tsetse-flies, since the flies avoid the neighbourhood of turbulent water and swift currents.*

A. A.

Awati (P. R.). **Bionomics of Houseflies. (i) Outdoor Feeding Habits of Houseflies with Special Reference to** *Musca promisca.* (*angustifrons* ?). **(ii) Attraction of Houseflies to Different Colours.**—*Indian Jl. Med. Res.* 1920. Jan. Vol. 7. No. 3. pp. 548–552, & 553–559. With 2 charts.

Awati (P. R.) & Swaminath (C. S.). **Bionomics of Houseflies. (iii) A Preliminary Note on Attraction of Houseflies to Certain Fermenting and Putrefying Substances.**—*Ibid.* pp. 560–567.

i. According to the author's critical observations both *Musca divaricata* and *M. promisca* are found in houses and food-shops and also feed on human faeces. *M. divaricata* prefers stale faeces—*e.g.* from trenches, or compounded with other refuse. *M. promisca*, on the other hand, prefers the real thing, as an isolated fresh stool. The author observed the latter species to frequent sweet-shops and eating-houses much more in the rainy season than at other seasons, and he draws a qualified inference from this observation.

ii. The author describes his careful experiments both in daylight and with artificial light. They show—in contradiction to the statements of some other observers—that houseflies do respond to different colours. Yellow has the greatest attraction ; red and violet have the least ; blue, green, orange, are intermediate. There was no evidence of any sex-difference in reaction.

iii. Separate substances were covered with perforated tangle-foot papers and left to ferment or putrefy, and day by day the several substances were chemically tested and the corresponding numbers of captured flies were noted. The authors' conclusions are that some strong-smelling products of putrefaction may be necessary to attract flies to what is otherwise a satisfactory food ; and that alkalinity or acidity of a fermenting or putrefying mass has nothing to do with its attraction.

In none of the substances used—rice, wheat, pulse, egg, fish, meat—did the houseflies lay eggs.

A. A.

Kobayashi (Seijiro). [**Flies of Korea.**]—*Chosen Igakkai Zasshi.* (*Jl. of the Med. Soc. of Korea.*) 1919. Apr. 12. No. 24. pp. 1–29. [From Review by Dr. Ohshima.]

The house-flies of Korea, as observed by this author over nearly three years, are not remarkably different from those of Europe, *Musca domestica* being enormously predominant ; *Muscina stabulans*, however, is shown to be about twice as numerous as *Fannia canicularis*, and both *Lucilia caesar* and *Sarcophaga carnaria* are infinitely more abundant than the local species of *Calliphora*. In one individual of *Calliphora lata* eggs of *Ascaris lumbricoides*, *Trichocephalus trichiurus*, *Trichostrongylus orientalis*, and *Ancylostoma duodenale* were found in abundance and apparently unchanged.

A. A.

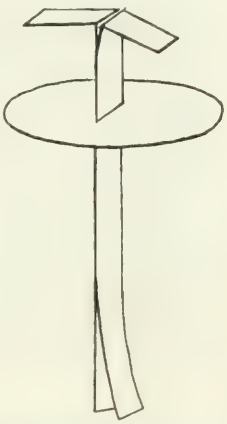
* The case is otherwise on rivers flowing to the George and Albert Lakes, where turbulent water below a fall is nearly always *palpalis* haunted [see *Sleep. Sick. Bull.*, Vol. 1, p. 96. [Ed.]].

Lloyd (Ll.). **On the Reasons for the Variation in the Effects of Formaldehyde as a Poison for House-Flies.**—*Bull. Entom. Res.* 1920. Aug. Vol. 11. Pt. 1. pp. 47–63. With 3 diagrams & 1 text-fig.

The author concludes from experiments here related that the efficacy of formaldehyde as a fly-poison depends on its freedom, when exposed, from formic acid and to a less extent from methylamine. That used for poisoning flies should therefore be colourless and free from fishy odour and should be neutralized with a weak alkali. The formula recommended is :—

40% Formaldehyde ..	5 parts.
Clear lime-water ..	50 parts.
Sugar	2·5 parts.
Water	42·5 parts.

This should be exposed in a trap to protect it from the air and to prevent flies falling in, and so keep it from becoming acid. The trap is of the form shown in the annexed figure. It is made of blotting paper and placed on the mouth of a bottle containing the poison, with its tail dipping in.



FORM OF TRAP FOR USE WITH FORMALDEHYDE.

(Reproduced by permission from the *Bulletin of Entomological Research.*)

A. A.

Austen (E. E.). **Diptera : Tabanidae. (The Percy Sladen Trust Expedition to the Indian Ocean in 1905 and 1907–1909, under Mr. J. Stanley Gardiner, M.A.).**—*Bull. Entom. Res.* 1920. Aug. Vol. 11. Pt. 1. pp. 43–45.

Four species of Tabanidae are here recorded from various islands of the archipelagoes lying northward of Madagascar. One of them, *Bouvierella inornata*, is described as a new species. Two others, *Aegophagamyia torticeps* Austen and *Tabanus albipectus* Bigot, are described as being strong on the wing, flying all over the lagoon as well as out to sea, and attacking marine turtles both on land and afloat.

A. A.

Walker (E. M.). *Wohlfahrtia vigil* (Walker) **as a Human Parasite** (*Diptera-Sarcophagidae*).—*Jl. Parasit.* 1920. Sept. Vol. 7. No. 1. pp. 1–7. With 2 plates.

The author notes in his references that the Sarcophagid genus *Wohlfahrtia* includes certain species formerly placed in the genus *Sarcophila*, and relates the occurrence of two cases of cutaneous myiasis in infants due to the maggots of *Wohlfahrtia vigil*.

A. A.

Dunn (Lawrence H.). **Studies on the Screw-Worm Fly,** *Chrysomyia macellaria*, **in Panama.**—*Proc. Med. Assoc. Isthm. Canal Zone.* 1917. July–Dec. Vol. 10. Part 2. pp. 33–66.

The screw-worm fly first attracted attention in Texas about 1834 and for many years was not noticed outside Texas, where, however, its destructiveness to cattle steadily increased. Now this fly occurs in nearly all parts of Southern and Central America, Mexico, the West

Indies and the Southern States of the Union, and is sometimes found in summer in the Northern States. Cold is fatal to its existence, the author's experiments showing that a temperature below the limit of 50° F. kills it in every stage of its life-cycle. On the other hand, arid heat is equally destructive, a dry temperature of 130° F. being in every stage mortal, while immature larvae cannot survive direct exposure to the sun, at an average air-temperature of 95° F., for a day. Though the fly deposits its eggs very freely on fresh carcases and corpses, and on meat, and may often be content with vegetable matter in a certain stage of decay, it has a decided propensity to lay them in wounds and abrasions and in the natural orifices of animals and man. The author has observed a tendency to bring forth late in the afternoon. The number of eggs observed in a single batch ranges from 48 to 287. The observed time for hatching ranges from 11 to 23 hours. The larval stage under the most favourable conditions of temperature, moisture and food occupies 5 or 6 days, and the pupal stage 3 to 10 days, but usually 4 or 5. Larvae in a pabulum buried under $2\frac{1}{4}$ feet of earth completed their development and emerged as flies.

A. A.

i. Alderson (Reginald). Ear-ache due to Larvae in the External Auditory Meatus.—*Brit. Med. Jl.* 1920. Aug. 28. p. 319.
ii. da Matta (A.). Dermato-Zooparasitologia. Considerações sobre a Dermatobiose.—*Amazonas Med.* 1920. Jan.–Mar. Vol. 3. No. 9. pp. 2–15. With 1 plate.
iii. Collier (W. A.). Gastrophiluslarven in der Haut des Menschen.—*Muench. Med. Woch.* 1920. Aug. 20. Vol. 67. No. 34. p. 991.

i. The ear-ache was sudden and soon became maddening. On examination a discharge of blood was first noticed, and then live maggots. Four small maggots were extracted : relief was instantaneous.

ii. A very complete account of *Dermatobia hominis* in all its aspects.

iii. The author gives references to cases and records, one of his own observation, where larvae of Gastrophilus were found in the skin of human patients.

A. A.

Buxton (P. A.). **Carriage of Coliform Bacilli by the Oriental Hornet (*Vespa Orientalis* Fabr.).**—*Jl. of Hyg.* 1920. July. Vol. 19. No. 1. pp. 68–71.

The oriental hornet frequents butchers' shops and fruit shops and also feeds on faeces, carrion, and all sorts of house refuse. Its digestive powers seem to be so savage as to discourage the hope of discovering any profusion of bacteria in the gut. Yet in 64 "workers" of this species examined by the author, 23 were found to be carrying common types of intestinal bacteria. The author therefore conjectures that the individual hornet is nearly as heavily infected with pathogenic coliform organisms as the individual house-fly ; but as it rarely invades mess-rooms and kitchens he does not consider it to be of great practical importance in spreading infectious disorders.

A. A.

MacGregor (Malcolm E.). **A Note on *Dermatophilus penetrans*.**—*Jl. Roy. Army Med. Corps.* 1920. May. Vol. 34. No. 5. pp. 441–443.

The author of this interesting note is inclined to support the native belief that chiggers generally get home on their victim at night, and that they are active only in dry weather, being very sensitive to wet and rain.

The author himself got infected in the toes soon after retiring to bed, though he did not at the time attribute the intolerable itching to chiggers or realize that some tiny black things that he had brushed off the sheet were these particular insects. The itching was quite forgotten until four or five days afterwards a toe became painful, and a sophisticated native servant, diagnosing the complaint, removed six chiggers in different stages of pregnancy.

Subsequently the author kept himself intact by rubbing his toes and soles with vaseline every day late in the afternoon and then sprinkling some Keating's powder into his mosquito boots, and by making his "boy" dust the powder between the sheets at the foot of the bed. His tent-mates, who at first scoffed at this ritual, were repeatedly infected, but at last they became converted and were saved from further trouble.

In a white man a chigger shows as a black dot in a ring of white, in an outer red inflamed ring.

In East Africa the natives are always very careful to burn an eradicated chigger, and the author extols and recommends this practice.

A. A.

Senior-White (Ronald A.). **On the Occurrence of Coleoptera in the Human Intestine.**—*Indian Jl. Med. Res.* 1920. Jan. Vol. 7. No. 3. pp. 568–569. With 1 plate.

The occurrence of small beetles in the human intestine, causing definite symptoms—*e.g.* pain, soft stools, cough, slight pyrexia—is said to be sufficiently frequent as to be recognized as "beetle disease" (*Kurumini Mandânâ* in the vernacular) in certain low-lying parts of Ceylon. The victims are generally children. A recognized species of these intestinal beetles is *Onthophagus bifasciatus*, belonging to the section Coprini of the family Scarabaeidae. The Coprini live on dung and decaying animal matter, and the author suggests, very reasonably, that in these pseudoparasitic cases the eggs may have been laid on the very odoriferous dried fish that forms part of the usual diet of the local villagers and coolies.

A. A.

Zuelzer (Margarete). **Biologische Untersuchungen an Zecken.** [Biological Investigations on Ticks.]—*Zeitsch. f. Immunitätsfsch. u. exper. Therap.* 1 Teil. Orig. 1920. Sept. 7. Vol. 30. No. 2. pp. 183–201.

The economy of blood-sucking arthropods which have speedily to assimilate enormous quantities of extraneous proteids is, as the author says, highly attractive to the biological theorist. A tick, such as *Argas persicus*, can starve for months and then in a very short time take in about five times its own body-weight of food. The bionomic adaptations of such an animal are likened by the author to those of a plant in a tract where rain seldom falls. When such a tick does get a fill all the metabolisms up to final assimilation and thence to the ultimate issue in ripe eggs must be performed with incredible celerity. The author's observations lead her to conclude that a normal tick acquires a tolerance of extraneous proteids so complete as to occlude its own specific albumin reaction. At any rate the specific albumin reaction of the unfed larva, which is identical with that of the egg-changes after the first intake of food by the larva. Such a tissue, tolerance is incredible in animals of other kinds.

A. A.

Bedford (G. A. H.). **Ticks found on Man and his Domestic Animals and Poultry in South Africa.**—Reprinted from *Jl. Dept. Agric.* 1920. July. 26 pp. With 29 figs. Pretoria : The Government Printing & Stationery Office.

This useful pamphlet contains a catalogue of the ticks of S. Africa and of the local hosts of each species, together with an account of the life-cycle and pathogenic importance of every species, so far as known. It is noted that *Ornithodorus megnini*, the spinous ear-tick, a native of America, has been carried to S. Africa and during the last few years has spread rapidly throughout the Cape Province, Orange Free State, and Bechuanaland. Though parasitic chiefly on calves, sheep, and goats, it attacks horses, donkeys, dogs, cats, and occasionally man. Its bite causes great irritation, and calves, sheep, and goats, badly infested, have been known to succumb.

A. A.

Lienhart (R.) & Rémy (P.). **Note sur la présence en Lorraine d'*Argas reflexus* (Fabricius 1794) et contribution a l'étude de sa biologie.**—*C. R. Soc. Biol.* 1920. July 24. Vol. 83. No. 26. pp. 1155–1156.

The authors record the finding in June, 1920, of living individuals of *Argas reflexus* in and near a pigeon-house at Nancy which had been untenanted by pigeons or any other birds since July, 1914. They quote two other authenticated instances of the survival of individuals of this species for six years without food.

A. A.

Escomel (Edmundo). **Le *Latrodectus mactans* ou "Lucacha" au Pérou. Etude clinique et expérimentale de l'action du venin.**—*Bull. Soc. Path. Exot.* 1919. Nov. Vol. 12. No. 9. pp. 702–720. With 1 text fig.

Lathrodectes mactans, the "Lucacha," is a small black spider with bright red abdominal spots, common throughout Peru, both on the plains and high cold plateaux, and notorious for its venomous bite. It lives in dry situations in deep burrows, the mouth of the burrow being snared with loose but tough strands of web. Deeper in the burrow is a denser web in which "cocoons" (*i.e.* bags of eggs) may be found. At certain seasons it migrates to the wheatfields and lucerne, and it is then that men and animals get bitten.

Its prey consists chiefly of beetles and Orthoptera. A particular species of Scorpion often shares its burrow.

Its venom is a milky, greeny-white fluid ; it also extrudes a clear faintly bluish liquid per anum.

The "bite" of the Lucacha is extremely painful and distressing to man, but not fatal ; in animals it causes symptoms of great distress, and to small animals it may be fatal. The general symptoms noted in the case of man are mortal fear, agonized dyspnoea, cough with clear frothy sputa, profuse salivation, lachrymation, and sweating ; twitchings, convulsions, headache, backache, and neuralgic pains ; delirium, hallucinations, and mental prostration ; haemoglobinuria, and sometimes oedema : after a few hours the symptoms gradually pass away. The local effects of the bite are spreading oedema and inflammation, which may become phlegmonous if not treated.

The venom exists in the eggs, being most active in the fresh egg and decreasing in virulence with the growth of the embryo: 60 eggs triturated in 1 c.c. of water are fatal to a guinea-pig.

The activity of the venom varies with the season: and the venom, remarkable to relate, is potent against individuals of its own species. In the venom the author differentiates a neuro-muscular toxin, a thrombocynase, a haemolysin, and in the egg a proteolysin.

The author describes several cases of Lucacha bite and goes fully into the treatment, which follows in a general way the treatment for snake-bites.

A. A.

Ewing (H. E.). **A Gamasid Mite Annoying to Man.**—*Jl. Parasit.* 1920. June. Vol. 6. No. 4. pp. 195–196. With 1 text fig.

The mite is here figured and redescribed by the name of *Hyletastes missouriensis* Ewing 1909. It annoys by tickling and also by making exploratory punctures with its chelicerae; whether it sucks blood or not is an unsettled question, but it leaves no marks. The mite was originally found in decaying leaves and under bark, and now, ten years after its discovery, it has attacked the author who rescued it from obscurity and gave it a local habitation and a name in science.

A. A.

Westphalen (H.). **Milben in den Fäzes des Menschen.**—[Mites in Human Faeces.]—*Deut. Med. Woch.* 1919. Nov. 27. Vol. 45. No. 48. p. 1333.

The author mentions two cases of mites being found in human faeces. In one case the mites might have been ingested in food. In the other case the author is certain that they were not merely ingested and passed, but must have been living in the gut. The symptoms in this case were those of a progressive dysenteric diarrhoea with passage of blood and mucus and periodically of mites.

[The reviewer was acquainted in 1892, in India, with a case of chronic and obstinate "dysentery" which was cleared up by the discovery in the stools of large quantities of indeterminate eggs; these being separated and kept were shortly resolved into a swarm of mites.]

A. A.

Warburton (Cecil). **Sarcoptic Scabies in Man and Animals. A Critical Survey of our Present Knowledge Regarding the Acari Concerned.**—*Parasitology.* 1920. Sept. Vol. 12. No. 3. pp. 265–300. With 1 plate & 10 text-figs.

This is a valuable work of reference. It includes a catalogue and commentary of all the species, and a full list of papers.

A. A.

Lénard (W.). Eine Agar-Agar fressende Milbe. Züchtung des *Tyroglyphus longior* (Gerv) auf Agar. [A Mite which feeds on Agar.]—*Cent. f. Bakt.* I. Abt. Orig. 1920. Aug. 14. Vol. 84. No. 7–8. pp. 539–541.

The cheese-mite, which feeds on organic matter of almost any kind, is here observed to feed on broth agar-cultures of bacteria, but not on sterile agar.

A. A.

Asana (D. J.). **A Case of Ophitoxaemia—Snake Poisoning: Snake identified, *Echis Carinata* [*Sic*] by the Natural History Society, Bombay. Recovery.**—*Indian Med. Gaz.* 1919. Nov. Vol. 54. No. 11. pp. 412–413.

The patient, an old woman, was bitten on the dorsum of the right foot by a snake identified as *Echis carinatus*. Potassium permanganate was rubbed into the wound about two hours afterwards and she was brought to hospital five hours afterwards.

On admission: the foot was painfully swollen and there was oozing from the wound; there was also continuous oozing from the palate, and severe abdominal pain. The patient was much frightened. She was put to bed, the wound was cleaned and dressed, $\frac{1}{3}$ gr. emetine hydrochloride was injected hypodermically, and 10 gr. calcium chloride was prescribed every three hours.

Next day the morning urine was bloody, oozing continued from the palate, the dressings were found soaked with blood, and there were large and painful subcutaneous ecchymoses of the right thigh and left shoulder. The emetine injection was twice repeated ($\frac{1}{2}$ gr.), and extract of ergot (m. 10) and adrenalin chloride solution (m. 5) was added to the calcium chloride prescription.

On the third day the oozing from the palate diminished and the urine was free from blood. Tincture of digitalis (m. 5) was added to the prescribed mixture as the pulse was weak.

On the fourth day oozing from the palate was slight and the subcutaneous ecchymoses were less painful.

On the fifth day haemorrhage stopped, and emetine was discontinued. And on the 10th day the patient was discharged whole.

A. A.

Velarde (C. -F.) & Miravent (J.). **Action des venins de Serpents sur l'utérus et l'intestin isolés du Cobaye.**—*C. R. Soc. Biol.* 1920. Oct. 30. Vol. 83. No. 30. pp. 1359–1360.

The tissues specified were suspended in a wide tube containing Ringer's solution kept oxygenated and at a temperature of 38° C. The liquid could be replaced, as required, by pure Ringer or Ringer charged with venom. The venoms studied were those of *Naja, Pseudechis, Bungarus, Crotalus, Ancistrodon, Lachesis, Vipera*, and *Echis*.

The venoms cause a marked initial excitation with strong contracture prolonged for some time and falling slowly to tonus. The most active were those of *Naja tripudians* and *Crotalus terrificus*. The uterus was affected by a dilution of 1 in 1,000,000; the intestine by a dilution even weaker. The action of adrenalin and of atropine was generally diminished, and sometimes very decidedly, during the action of venom. This fact, taken with the rapid decrease of electrical and chemical excitability of the poisoned muscle leads the authors to the conclusion that the venom acts directly on the unstriped-muscle-fibres.

A. A.

Penteado (Dorival de C.). **Estudos histológicos das glandulas da cabeça dos ofídios brasileiros.** [Histological Study of the Glands of Brazilian Snake's Head].—*Memórias do Instituto de Butantan.* São Paulo. 1918. Vol. 1. No. 1. pp. 27–45. With 5 plates. [English summary p. 43.]

A purely descriptive paper, with five illustrations, of the glands of the head of certain Brazilian snakes. The species examined are, of aglyph

Colubridae, *Drymobius bifossatus*, *Xenodon merremii*, and *Rhadinaea merrimi*; of opisthoglyph Colubridae, *Philodryas schotti*, *Tomodon dorsatus*, and *Thamnodynastes nattereri*; and, of Boiidae, *Constrictor constrictor*.

A. A.

Brazil (Vital). **Sôro anti-escorpiónico.** [Anti-scorpionic Serum].—*Mem. Inst. de Butantan.* 1918. Vol. 1. No. 1. pp. 47–52.

The method of preparing scorpion (*Tityus bahiensis*) anti-venom is described. The immunisation of the animal destined to supply the anti-venom takes from a fortnight to a month. A useful bibliography is appended.

A. A.

MALARIA.

i. Swellengrebel (N. H.) & Swellengrebel de Graaf (J. M. H.). **A Malaria Survey in the Malay Archipelago.**—*Parasitology.* 1920. Sept. Vol. 12. No. 3. pp. 180–198.

ii. **Malaria in Modjowarno.**—*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1919. Pt. 10. pp. 73–112c. With 14 tables, 9 charts & 1 plate. [In Dutch & English.]

iii. **Rapport over het voorkomen van malaria en Anophelinen te Semarang. Report on the Occurrence of Malaria & Anophelines at Samarang.** *Ibid.* pp. 113–168. With 11 tables, 6 diagrams, 4 maps & 5 plates. [In Dutch & English.]

i. In this admirable piece of work it is pointed out that the existent comparative failure of anti-malarial work is essentially the result of a failure to identify the particular anopheline species which is the main intermediary in any particular locality, and that this latter failure is at least in part due to the difficulty in identifying anophelines under past conditions of confused nomenclature. It is often quite impossible to destroy all anopheline breeding places, but if it be possible to determine the chief local intermediary, and if this species have breeding places of a restricted kind, the abolition of these gives an excellent prospect of producing, with a minimum of trouble and expense, a marked diminution in human infestation.

The determination of the main intermediary may be effected, (*a*) directly, by determining the rates of (1) experimental infectivity, artificially reared specimens of the various mosquitoes inhabiting the region being fed on suitable gamete carriers, (2) natural infectivity, a more certain method, wild mosquitoes being caught and dissected; and (*b*) indirectly, by determining whether malarial incidence coincides with the distribution of any particular anopheline. Even when the main intermediary has been thus determined it is useless to assume that its larval habitat in any district is necessarily the same as is the case even in an adjoining one. The habitat must be actually determined in every locality for every species. Even then perplexities are not at an end, for a mosquito, when the favourite kind of breeding ground is rendered useless to it, may readily take to another kind, so that a constant watch must be kept with this in view.

Working on these lines the writers place the anophelines of the Malay Archipelago in the following sequence, the most harmful epidemiologically being the first.

(1) *Myzomyia ludlowi*; (2) *Myzomyia aconita, Nyssorhynchus maculatus,* (perhaps also *Stegomyia Stethomyia aitkenii*); (3) *Neomyzomyia leucosphyra, Myzorhynchus umbrosus*; (4) *Nyssorhynchus fuliginosus, Myzorhynchus sinensis* (?=No. 6); (5) *Cellia kochii*; (6) *Myzomyia rossii, Myzorhynchus barbirostris, Neomyzomyia punctulata* (*tesselata*); (7) *Myzomyia indefinita.*

ii. Using the principles just mentioned it was found that between March and June–July, during which period malaria had increased twenty-fold, the rice fields had been flooded and *Anopheles aconita* had appeared in numbers, particularly where there was growing a type of paddy which collapses into the water and from which the grain is plucked, not cut (*padi krekes*). The natural infection rate gave *A. aconita* as the highest, with *punctata* and *indefinita* also infected, the percentages being 2·3, 0·7, and 0·3 respectively. The evidence

then is that there is here a malaria directly associated with the cultivation of paddy, and it is suggested that mitigation of its ill-effects may possibly be attained, if this be agriculturally feasible, by stopping flooding of the paddy fields as soon as the grain has matured, draining them after the harvest, and allowing the planting of no second crop unless this have a fair chance of success. Such regulations would have to be tentative until it had been ascertained that *aconita* if deprived of paddy fields as breeding grounds will not breed equally freely in irrigation ditches.

Some other interesting factors in the local problem are that the maximum of infection occurred between the ages of ten and fifteen ; that malaria varied in adjacent villages in a manner not explicable merely by the known facts regarding mosquito prevalence ; that under quinine crescents disappeared more rapidly than the vegetative forms, an observation the writers explain by a shorter longevity in the crescents, their formation from vegetative forms being interfered with by the action of quinine on the latter.

iii. Working on the same principles in the seaside municipality of Samarang, two malarial foci were distinguished, one on the coast, probably permanent, corresponding to the distribution area of the larvae and imago of *M. ludlowi*, which has a natural infection index of 4·1%, *M. rossi* having 0·7 and *M. indefinita* 0·1. The second infective focus lay at the foot of the hills ; its active intermediate host was not discovered. The maximum [? average] flight of *M. ludlowi* was estimated at 1·6 km., while it may exceed 2 but not 3·5 kms.

Clayton Lane.

Gill (C. A.) & Harnam Singh (Bawa). **Report on Malaria in Thanesar Town**—16 pp. & v pp. With 2 folding maps. 1920: Lahore. Printed by the Superintendent, Government Printing, Punjab. [Not for sale.]

Thanesar :—a dying ruined town, and spot of special Hindu sanctity and pilgrimage in the Punjab ; raised on a hill produced by huge surrounding excavations kept full of water by annual inundation from mountain-fed rivers and swarming with larvae of *Anopheles culicifaciens, A. fuliginosus, A. sinensis* and *A. rossii*, the adults harbouring in ruins and jungle ; peopled by brahmins, living precariously on alms from pilgrims visiting the place in thousands at the time of a solar eclipse, and jealous of any suggestion of western interference ; cared for by a bankrupt municipal committee ; possessing an average spleen rate of 61 and a malaria rate which has been as high as 50%. Such is the problem facing the writers.

The suggested solution is the abandonment as a town of this hyper-endemic centre and its rebuilding on a site 3 or 4 miles distant, provided that annual inundation and intra-urban excavation can be eliminated. [But will the brahmin move ?]

C. L.

Gill (C. A.). **The Relationship of Malaria & Rainfall.**—*Indian Jl. Med. Res.* 1920. Jan. Vol. 7. No. 3. pp. 618–632. With 4 charts.

The trouble about this paper is that the writer presupposes in the reader a knowledge of Christophers' work ; and of his own " Report on Malaria in Amritsar " (this *Bulletin* Vol. 12, p. 35) in which he

described the results of a scientific study of malaria on modern lines. It has already been proved by blood and spleen tests that the great fever epidemic which overran the Punjab in 1908, and incidentally affected Amritsar, was malaria ; and that in ordinary years a relationship exists between malaria and the fever returns in Amritsar. The purpose of the paper under review is to show that there exists a correlation between the July–August rainfall and the fever incidence, and therefore, since the correlation between malaria and fever in Amritsar has already been demonstrated, between the July-August rainfall and malaria. This being so it is possible to forecast with considerable accuracy the occurrence of malarial epidemics in the Punjab. These observations, typical of the excellent work now being done by the civil officers of the Sanitary Department, work not exceeded in value by any other workers in India, promise to be of great administrative value ; but it should not have been left to the reader to unravel the line of proof.

C. L.

Leger (Marcel). **L'endémie palustre à la Guyane française. Documents cliniques et microbiologiques.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1920. (Numéro exceptionnel). pp. 5–32.

In French Guiana in patients of many races, some free, some enduring transportation, malaria is rife. The microscope shows all three species of parasite ; but clinically because, as the writer believes, all are already partly under the influence of quinine they conform to one type, a fever nearly always continuous while under observation. Common complications are, oedema of the lower limbs unassociated with beriberi or ankylostome infestation ; bronchitic signs, especially apical ; a slight daily rise in temperature without evidence of circulating parasites ; and, in convicts, malarial cachexia. Convulsions replacing the rigor appeared in a child with benign tertian infestation, and in one case, already reported, there occurred premature delivery of a still-born infant whose blood contained many schizonts and gametes of benign tertian malaria and whose mother was suffering from the same infestation. While pernicious paroxysms were not uncommon, " typho-malaria " and blackwater fever were unobserved. The treatment advised is the daily administration of 2·5 gm. of a quinine salt. The endemic index is found to vary in different parts of French Guiana between 3 and 40 ; seasonal differences are slight ; but subtertian infestations are considerably greater and tertian infestations considerably less in children than in adults. It is believed that " Hindus " are refractory to infestation.

C. L.

Rabinoff (Sophie). **Some Experiences with Malaria among Children in Palestine.**—*Arch. of Pediatrics.* 1920. Aug. Vol. 37. No. 8. pp. 494–502.

A graphic and more or less popular account of the usual manifestations of malaria as likely to strike one unused to daily contact with the disease. A case of congenital malaria is recorded in which " tertian parasites " were found in a baby twelve hours old whose mother had previously been treated for malaria in the same hospital.

C. L.

Gaskell (J. F.) & Millar (W. L.). **Studies on Malignant Malaria in Macedonia.**—*Quart. Jl. Med.* 1920. July. Vol. 13. No. 52. pp. 381–426. With text-figs.

From autopsies on thirteen cases the writers divide fatal malarial infestations into three types, the true cerebral, the septicaemic and the cardiac. In the true cerebral there is an intense invasion of the brain by parasites, a phenomenon explained by the use of the curious expression " the brain has assumed the function of manufacturing all forms of malignant parasite in numbers." These numbers in the brain are, it is pointed out, disproportionate to those in the circulation, and the finding in the capillaries and white matter of the brain of forms intermediate between rings and crescents is taken as evidence that development progresses there. Treatment is useless.

In the septicaemic form there is an extremely high parasitic content of the blood followed by coma, and treatment should be initiated on the detection of the heavy haemal infection and before this has caused symptoms. In the cardiac case, evidenced by collapse, while no films of the peripheral blood were examined during life, nor smears of the internal organs taken after death, it is assumed that there were no cerebral lesions. Malarial parasites were, however, found in the undifferentiated protoplasm round the nuclei of the cardiac muscle fibre, a fact which is believed to be of importance as indicating that this is a place where " the parasite may be stored up in quiescent periods between attacks."

C. L.

Geiger (J. C.) & Purdy (W. C.). **The Malaria Problem of the Rice Field of the United States.**—*Southern Med. Jl.* 1920. Aug. Vol. 13. No. 8. pp. 577–584.

The rice-fields of Louisiana, Arkansas and California were studied with a view to determining their effect on malaria. In Arkansas *Anopheles quadrimaculatus* bred enormously in the rice-fields. The dripping of oil upon the incoming irrigation water was ineffectual in destroying the larvae, since it was not thereby evenly distributed, and since some rice was killed. By saturating a bushel of sawdust with three gallons of oil and sowing this broadcast the oil was perfectly distributed, larvae practically annihilated and the rice unharmed. Top-feeding minnows, in the proportion of 1,400 to the acre, produced a moderate diminution of mosquito larvae ; intermittent flooding of the fields did not destroy the latter.

In Louisiana top-feeding minnows proved fairly satisfactory. The mosquitoes were mainly *A. quadrimaculatus*, with *A. punctipennis* and *A. crucians* during the early part of the season, the last being the only larva present at a time when salt water got into the irrigation canals.

In California the fields themselves showed practical freedom from larvae, although the irrigation ditches and seepage pools swarmed with *A. occidentalis*, *A. pseudopunctipennis*, *C. tarsalis* and *Aedes currei*.

Stained *A. quadrimaculatus* established a flight record of 1·7 miles, the direction being that of the greatest concentration of human food. The total annual incidence of clinical malaria was in Arkansas and Louisiana 20% and in California 13% of the population, while the maximum monthly blood index was 2·2. The usual recommendations for prevention are made.

C. L.

Fricks (L. D.). **The Malaria Awakening of the South.**—*Jl. Amer. Med. Assoc.* 1920. Sept. Vol. 75. No. 13. pp. 847–851.

This paper, read before the Section on Preventive Medicine and Public Health at the 71st Annual Session of the American Medical Association, and the discussion which followed, urge the necessity, if possible, for enunciating the malaria problem in terms of dollars and cents, the loss to the community caused by malaria on one side of the ledger and the cost of malarial protection on the other. There were emphasised the importance of avoiding what Carter calls " man-made malaria " in the construction of drainage projects, highways, railways and water reservoirs ; of the educative value of successful malaria control operations such as those instituted in extra-cantonment areas during the war ; and of the need of the thorough treatment of all cases by all physicians. The treatment recommended, with no suggestion that it is infallible, is the administration of three ten-grain doses of sulphate of quinine for 3 or 4 days, and thereafter ten grains of the same salt nightly for eight weeks.

C. L.

Piras (L.). [**L'anophélisme sans malaria dans la province de Gênes.**]—*L'Igiene Moderna.* 1920. Jan. Vol. 13. No. 1. p. 1. [Summarised in *Bull. Office Internat. d'Hyg. Pub.* 1920. July. Vol. 12. No. 7. pp. 757–758.]

Piras believes that malaria disappeared from the province of Genoa between 1885 and 1890 because anopheles were diminished in numbers as the result of intensive cultivation, the control of waterways and the removal of stagnant water ; that it has not reappeared (except in Vezanno Ligure), in spite of the immigration of infected persons because (except in Vezanno Ligure) there has been no increase in the numbers of mosquitoes and the number of infected persons has not increased to the epidemic point ; that it will disappear from Vezanno Ligure when the mosquitoes reach normal numbers ; and that the expressed fears of a flaring up of the disease on the return of infected soldiers to their homes are groundless, so long as proper drainage is ensured.

C. L.

Lawson (Mary R.). **Segmenting Tertian Malarial Parasites on Red Corpuscles showing little or no Loss of Haemoglobin Substance. Evidence of Migration.**—*Jl. Experim. Med.* 1920. Aug. 1. Vol. 32. No. 2. pp. 139–142. With 2 plates.

The writer concludes that a malarial parasite destroys more than one red corpuscle, migrating to a new one as soon as the first is destroyed because (1) she has seen migrating parasites in eight different stages of development, the oldest form being the presegmenting parasite ; (2) the existence of pigmented segmenting parasites attached to red corpuscles with intact haemoglobin is *prima facie* evidence of migration. It is further stated that infected corpuscles in tertian infection " may be enlarged as a result of the large size of the attached parasites as well as by parasitic action." Two beautiful plates of microphotos accompany the paper.

C. L.

ROSENFELD (S.). **Zur Statistik der Malaria bei Heimkehrern.** [Malaria Statistics among Demobilised Persons.]—*Mitt. d. Volksgsndhtsamt.* Vienna. 1920. Apr. 20. No. 8. pp. 269–272.

During 1919 there were notified in Austria (*sensu stricto*) 9,507 cases of malaria of which 99 came from the district of Tulln. House to house visits in this district discovered 450 demobilised persons who had suffered from malaria. On this basis it was estimated that in February, 1920, Austria contained 50,000 infected persons, and that spring would bring numerous relapses.

C. L.

ENRIGHT (J. I.). **A Note on the Incidence of Ascites and Oedema in Malaria.**—*Lancet.* 1920. Oct. 9. pp. 748–749.

In ten cases, "eight malignant and two benign," all apparently German prisoners on the Palestine front, there occurred polyuria with ascites and general anasarca, albuminuria without casts, marked anaemia, present or past fever, and malarial parasites in the circulation. In the same group of prisoners two cases of blackwater fever occurred, and it is suggested that the same pathological basis may account for the nephritic character of both sets of cases. [Readers will remember the incidence of pellagra among these prisoners.]

C. L.

PLEHN (A.). **Zur Lehre der Einheit der Malariaerreger.** [The Unity of the Malarial Parasite.]—*Arch. f. Schiffs-u. Trop.-Hyg.* 1920. Sept. Vol. 24. No. 8. pp. 225–227.

Commenting on a paper by MARTINI [*see* this *Bulletin,* Vol. 16, p. 323]. Plehn reasserts his known views on the unity of the parasite. As a point in favour of this he announces that SCHAUDINN told him that there were twenty species of malarial parasite.

C. L.

SEYFARTH (Carly). **Ueber die Aetiologie der Malariakrankheiten.** [The Cause of Malaria.]—*Med. Klinik.* 1920. Aug. 26. Vol. 16. No. 34. pp. 867–869.

The writer, after a review of certain literature, of which he appends a list, concludes that the specific unity, or otherwise, of the malarial parasite is unproven. It may be added that the whole of the references to literature which he does append are, with the exception of one French paper, confined to German publications.

C. L.

MICHAEL (W. H.). **An Unusual Case of Malarial Crescents.**—*U.S. Nav. Med. Bull.* 1920. July. Vol. 14. No. 3. pp. 395–396.

This short note describes a case in which there was a heavy infection with crescents within a month of the first appearance of symptoms and within two months of the first possible exposure to the disease. Since the writer looks upon this as a quite exceptionally short period he suggests that inefficient adminstration of quinine may have been the cause of this usual phenomenon.

C. L.

Dupérié (R.). **Deux cas de paludisme autochtone chez des enfants.**—*Gaz. hebd. des Sciences Méd. Bordeaux.* 1920. Aug. 15. Vol. 41. No. 33. pp. 389–393.

Three cases are really here reported. The first a child of ten and a half, living near the marshes of Bordeaux, had a dental abscess incised, and ten days later fever commenced, supposed to be tubercular, for which she was sent to the Pyrenees with excellent results. On return to Bordeaux relapse followed and a blood examination revealed a benign tertian infection. The second case was a girl of six having typical malarial paroxysms, blood examination showing benign tertian parasites. She lived close to a camp which had consecutively harboured Americans, Senegalese, Assamese and Indo-Chinese.

The third case was the mother of the second who had a typical malarial paroxysm while visiting her child in hospital and in whose blood the same parasite was found.

[In the first case the possibility of direct infection, as suggested by Ross, arises. (*See* below.) In the second and third the associated infections of mother and child seem to point to indirect infection in the manner emphasised by Bass. (*See* above.)] C. L.

Oettinger (W.) & Deguignand (L.). **Un cas de fièvre tierce maligne autochtone.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1920. Aug. 5. Vol. 36. No. 28. pp. 1193–1196. With 1 chart in text.

This interesting case constitutes the sixth instance of indigenous malignant tertian malaria appearing in France. The man had never left the country and had been brought up at Dordogne, Nadaillac, which is not marshy and where malaria is unknown. It is supposed that he must have become infected in Paris or in its suburbs.

He had a chronic, rather undulant, fever with headache, diarrhoea, dry tongue, aphthous mouth, enlarged liver and spleen, and gurgling in the iliac fossae. "*Amoeba coli*" and trichomomas were present in the stools. Typhoid was naturally suspected, and it was only because a routine examination of the blood was made and merozoits and crescents found there, that the proper treatment was fortunately instituted. C. L.

Emile-Weil (P.) & Plichet. **Un cas de fièvre tierce maligne autochtone terminé par la mort.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1920. Nov. 4. Vol. 36. No. 32. pp. 1276–1279.

This is the seventh case reported from France, and in spite of an early diagnosis and free exhibition of quinine, by mouth, rectum and intravenously he died. His symptoms were intense anaemia, enlarged spleen and a quotidian fever, the actual cause of death being, however, not clear from the record. The writers point out the association between syphilis and the indigenous malarias of France. C. L.

(i) Glynn (Ernest E.) & Matthews (J. C.). **A Fatal Case of Malignant Tertian Malaria contracted in the North of England.**—*Brit. Med. Jl.* 1920. Nov. 27. pp. 811–813.

(ii) Ross (Ronald). **Malignant Malaria contracted in Britain.** [Correspondence].—*Ibid.* 1920. Dec. 4. p. 871.

(i) A girl of 18, born and residing in Liverpool, had 5 or 6 teeth extracted. On the 14th day after this she visited a valley subsequently

found to harbour large numbers of hibernating larval and adult anophelines. On the sixteenth and eighteenth days she vomited, being flushed on the latter. On the 25th day she had to be helped home by a passer-by, becoming faint in the street, and thereafter remained under treatment with some delirium, severe headache, photophobia and intermittent unconsciousness. Meningitis was suspected, but a slight vaginal discharge, accompanied as it was by profound anaemia and unconsciousness lead a gynaecologist to diagnose metrorrhagia and to advise hospital treatment. She only survived admission 2 hours and died on the thirtieth day after the dental extractions (about a fortnight after her first evidence of illness) with a temperature of 102·6°. The temperature had only been taken once previously and was then over 100.° Autopsy showed a spleen enlarged to 23 oz., engorged with blood, without fibrosis, and containing, as did the blood in the large vessels, numerous crescents and segmenting malignant malarial parasites. There was marked erythroblastic reaction in the red marrow and some of the lumbar glands resembled haemolymph glands. The writers claim this as the only case of indigenous malignant malarial infection, and the only death from indigenously contracted malaria in Britain.

(ii) Ross inquires whether this girl had had any subcutaneous injection from a week to a month before her illness began, or whether the dentist had just previously dealt with an old case of malaria. He states that a number of cases of malignant malaria occurred in Britain during the war as the result of such injections (he is not free to give details), and considers blood-to-blood communication proved by these experiences.

C. L.

Pagniello (R.). [**Diagnostic Painful Point in Malaria.**] *Semana Médica.* Buenos Aires. 1920. June 17. Vol. 27. No. 25. p. 830. [Summarised in *Jl. Amer. Med. Assoc.* 1920. Nov. 20. Vol. 75. No. 21. p. 1458.]

After thirty years' experience in a malarial zone in Italy Pagniello states that tenderness between the median and posterior axillary lines in the ninth left intercostal space (exceptionally in the eighth or tenth) is diagnostic of malaria, its detection rendering a blood-examination unnecessary.

C. L.

Massari (Cornelius). **Milzruptur bei Malaria.** [Rupture of a Malarial Spleen].—*Wien. Klin. Woch.* 1920. Oct. 14. Vol. 33. No. 42. pp. 917–921.

A man aged 23 contracted fever in Albania. Six months later, while stepping across a railway line he tripped and fell against the edge of an engine-cleaning pit, rupturing his spleen. When operated upon sixteen hours afterwards the spleen was found enlarged six-fold. Holding the pedicle with one hand Massari broke down adhesions to the diaphragm with the other, only to find that the pedicle could not be tied. The ruptured and torn adhesions were treated with gauze plugs, intravenous saline given, and complete surgical cure followed in about two months. A considerable but incomplete reference to the literature concerned accompanies the paper.

C. L.

Cumston (Charles Greene). **Intestinal Symptoms in Malaria.**—*New York Med. Jl.* 1920. Oct. 23. Vol. 112. No. 17. pp. 632–634.

The writer draws attention to diarrhoeal attacks in acute malaria, which he holds to be for the intestine what bilious vomiting during a paroxysm is for the stomach. It is somewhat confusingly said that they sometimes last as long as the attack of malaria but generally subside on the second or third day and cease with the sudoral crisis. He believes these attacks to be essentially hepatic and related to malarial cirrhosis.

C. L.

Wood (D. J.). **Accommodative Failure in Malaria and Influenza.**—*British Jl. Ophthalm.* 1920. Sept. Vol. 4. No. 9. pp. 415–416.

Cases are cited indicating that " in malaria probably and in influenza certainly the failure of the ciliary muscle seemed to be out of all proportion to the amount of general illness and persisted after the patient felt quite well again." In malaria the inability to read was accompanied by headache and photophobia.

C. L.

i. Simons (H.). **Eine ganz aussergewöhnliche Malaria quartana.** [A Very Unusual Case of Quartan Malaria.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1920. Aug. Vol. 24. No. 7. pp. 206–209.

ii. Mayer (Martin). **Bemerkungen zu obiger Arbeit.** [Note on the above.]—*Ibid.* p. 209.

A man who had wandered from hospital to hospital with quartan fever, persisting in spite of all treatment, presented attacks in which there was a cold stage of a few minutes ; a hot stage of one to two hours although the thermometer showed a rise of temperature lasting from fifteen to forty-five minutes only and running as high as 110° F. ; and a sweating stage often beginning at the same time as the hot one. He was often strongly cyanosed, complained of cardiac oppression and air-hunger, had passed into a twilight state once and was a marked psychopath. The blood was examined many times and two small rings were found on one occasion only. On this the diagnosis rests. Although the unusual character of the attacks is appreciated the possibility of fraud is not mentioned. The events occurred in 1915–16.

C. L.

Hostalrich. **Note sur un cas de " fluxion mammaire " d'origine malarienne.**—*Rev. Méd. d'Hyg. Trop.* 1920. Vol. 12. No. 1. pp. 18–19.

The writer describes a case of pregnancy near term in which symptoms of acute, apparently general, mastitis, with chills, fever and sweating subsided after 48 hours' administration of quinine without any local treatment. The diagnosis is evidently based mainly on the response to quinine, no blood examination having been made. Normal labour occurred. He further cites a case of orchitis occurring in a European during an attack diagnosed clinically as malaria.

C. L

WEINGARTNER (Alfred). **Beitrag zur Kenntnis der Gehirnveränderungen bei Malaria.** [The Condition of the Brain in Malaria.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1920. Aug. Vol. 24. No. 7. pp. 193–206. With 2 text-figs.

This paper contains post-mortem microscopic and macroscopic reports on two cases diagnosed as malaria, no clinical histories being given. The first describes with two good illustrations the usual conditions found in cerebral malaria, with the added item of extensive calcification of the walls of the finest arterioles, the capillaries and venules, a condition here definitely attributed to malaria. In the second case no malarial parasites were found, the only evidence of malaria actually offered being the finding of some pigment in the spleen. The outstanding feature was universal haemorrhages attributed to quinine, which therefore had presumably been administered during life.

C. L.

OEHLECKER (F.). **Uebertragung latenter Malaria bei direkter Bluttransfusion.** [Latent Malaria Transmitted by Blood Transfusion.] —*Deut. Med. Woch.* 1920. Sept. 9. Vol. 46. No. 37. pp. 1025–1026. With 1 chart in text.

A case of sarcoma of the nose became after operation excessively anaemic from haemorrhage, and transfusion of a litre of blood was made from the patient's son who had lived in Liberia from 1911 to 1917, but who had never had fever. The sick man did well until the fourteenth day, when the temperature rose, with the usual concomitant symptoms. At first influenza, and later, when the spleen enlarged, septic infection from the wound were suspected. On the ninth day a definite rigor led to a blood examination for the purpose of a leucocyte count. During its course malarial parasites were discovered, quinine was given and symptoms and parasites disappeared. Inquiry showed that the donor had, while in Liberia, taken 0·2 gm. of quinine daily, which dosage had only been discontinued on his transference to Germany 2½ years ago. Since then he had lived in Hamburg. About 36 hours after acting as donor he had his first and only rigor, while gastric and splenic pains lasted for 2 or 3 days. Complete recovery then followed, but blood examinations three weeks later were negative. The unusual delay in the appearance of symptoms, corresponding rather to an infection with sporozoits than one from man to man, is noted.

C. L.

BASS (C. C.). **An Attempt to explain the Greater Pathogenicity of *Plasmodium falciparum* as compared with other Species.**—*Jl. Trop. Med. & Hyg.* 1920. Oct. 1. Vol. 23. No. 19. pp. 237–238.

This paper cannot be better summarised than in Bass's own final words :—

"In conclusion, the theoretical explanation offered for the greater pathogenicity of *P. falciparum* is that the shape of the parasite and unyielding consistency of the substance of which it is composed results in parasites lodging in capillaries to greater extent and there multiplying in larger numbers, more of which survive, than occurs in the other species. The amoeboid activity is greater and the cytoplasm is less resistant to pressure in the other species, which is unfavourable to their lodging in capillaries, causing more of the segmentation to take place in the circulation where the merozoites produced are promptly

destroyed. This theoretical explanation is based largely upon the observation that artificially cultivated falciparum parasites are more resistant to pressure, that they have little or no amoeboid motion in contrast with the other species and upon the finding at autopsy of much larger numbers of capillaries obstructed by falciparum parasites."

C. L.

Cremonese (Guido). **Il meccanismo della febbre malarica (Immunita e resistenza.**—*Malariologia.* 1920. Feb. 29. Vol. 13. No. 1. pp. 1–24.

An attempt to explain the malarial rhythm in terms of amboceptor antigen and complement. The author works out his theory in detail and summarises as follows :—

It is absurd to suppose that the defence of the organism against malaria has a different mechanism from that now known to be general.

The mechanism may be thus outlined.

(1) The antigen of malaria is the merozoite in its extra-globular phase : having once entered the corpuscle it ceases to act as antigen.

(2) Conversely the humoral method of defence of the organism can only deal with the parasite in its extra-globular phase, once within the corpuscle it is safe from attack.

(3) The febrile reaction, at first irregular owing to the continuous formation of antigens, becomes regular through the formation of anti-bodies and by reason of the natural period of incubation of the parasite.

(4) This explains why the Wasserman reaction is sometimes positive sometimes not. Neither antigen nor antibody is always present.

(5) Quinine fastens itself on the red corpuscles and expels the parasites from them.

(6) Quinine, therefore, given before the attack, keeps the parasites outside the corpuscles where they are an easy prey to the anti-bodies.

(7) The initial fever is continuous because there is not yet developed a sufficiently strong humoral reaction.

(8) The humoral reaction, in conjunction with the period of schizogonic incubation, determines the apyretic periods.

(9) With the gradual prevalence of the formation of anti-bodies the case tends towards spontaneous cure.

(10) With diminution of their formation the tendency is towards cachexia (cessation of the faculty of emitting receptors on the part of the red corpuscles).

(11) Quinine has a poisonous action on the red corpuscle which, to defend itself, sends out ever more receptors until exhaustion supervenes and it breaks up (haemoglobinuria).

(12) Or, on the other hand, the corpuscle has sufficient strength to defend itself, repels the quinine, and we have quinine resistance *of the red corpuscle.* In this case the parasite resumes its ordinary activity in spite of the administration of quinine.

F. S. Arnold.

Bass (C. C.). **Responsibility of Physicians who treat Malaria Cases.**—*Southern Med. Jl.* 1920. Oct. Vol. 13. pp. 693–695.

To obtain that co-operation between medical man and malarial patient, without which disinfestation by a thorough course of quinine is impossible, Bass urges that it should be impressed upon the latter that infestation and infectivity may remain after all symptoms have disappeared, the former manifesting itself in unexpected relapses, the latter constituting a peculiar danger to the very persons the carrier will be most anxious to shield, namely, the members of his own family ; since a mosquito, after ovipositing, is apt to return to the spot where she obtained her original feed and will in such a case have become infective. The course of quinine recommended is that now generally advised in the States as producing disinfestation in over 90% of cases, namely, an eight weeks' course, after all symptoms have disappeared, of ten grains of the sulphate nightly.

C. L.

De Buys (L. R.). **An Important Factor in the Successful Treatment of Malaria.**—*Jl. Amer. Med. Assoc.* 1920. Oct. 9. Vol. 75. No. 15. p. 1003.

It is here suggested that many cases supposed to be malarial relapses are really cases of reinfection from other members of the family, and recommended that in such recurrences the whole family should be examined, and any household carriers treated.

C. L.

Brahmachari (U. N.). **A Preliminary Report on the Minimum Curative Dose of Quinine in the Treatment of Malarial Fever by the Intravenous Method.**—*Indian Med. Gaz.* 1920. Oct. Vol. 55. No. 10. pp. 366–370. With 6 charts.

Two cases of quartan and three cases of benign tertian malaria were treated with seven intravenous injections of quinine (the salt being unstated) of ten grains each, either on consecutive days, or, in one case of quartan malaria, on the day of the expected paroxysm. Parasites disappeared, and no relapse occurred during the period of observation, which was maintained for from six to twelve months. In two cases of benign tertian and one of malignant tertian similar results followed, but the cases were only followed up for about two months. It is concluded that by these doses complete sterilisation of quartan and benign tertian malarias can be effected.

C. L.

Wyatt (B. S.). **The Intravenous Treatment of Malaria.**—*New York Med. Jl.* 1920. Sept. 11. Vol. 112. No. 11. pp. 366–369.

As the result of the teachings of others the writer has given quinine, iron and arsenic intravenously in 32 cases of malaria with prominently positive and uniform results, so that he considers this the ideal treatment. The dose of quinine, in bihydrochloride form, was " five tenths grain " and of iron and arsenic 64 mgm., the preparation not being stated. Presumably in the quinine dosage " grain " is a misprint for the Americanised form of " gramme."

C. L.

Michael (W. H.). **Satisfactory Treatment of Malaria.**—*U.S. Nav. Med. Bull.* 1920. July. Vol. 14. No. 3. pp. 367–370.

Believing that quinine is only effective in killing malarial parasites during sporulation the writer advises, for benign tertian malaria, two courses of quinine with an interval of four days, with the intention of killing all asexual forms by the first treatment, the interval allowing of sexual forms becoming asexual, as he surmises, and falling victims to the second treatment. Each treatment is preceded by thorough purgation, and consists essentially in the taking, aided by an alarm clock and a resolute mind, of three grains of quinine every two hours night and day for 48 hours. Apparently about 45 cases have been observed, and a fortnight's freedom from relapse is seemingly accepted as satisfactory evidence of the beneficent nature of the course.

C. L.

Salotti (A.). **Malaria Chinino-Resistente e Neosalvarsan.**—*Ann. di Med. Nav. e Colon.* 1920. Jan.–Feb. Vol. 1. No. 1–2. pp. 48–57.

The author holds that quinine-resistance is a condition of acquired immunity on the part of the malaria parasite. He states that in 23

cases of quinine-resistant malaria he has obtained excellent results from endo-venous injections of neo-salvarsan. The facts relating to these 23 cases are given in schematic form and the author states his conclusions as follows :—

1. In the treatment of chronic quinine-resistant malaria neo-salvarsan is the specific remedy. It quickly brings about a reconstruction of the blood through its stimulating effect on the haematopoietic organs and has thus both a curative and a tonic action.

2. In grave acute forms (perniciosa) it is an admirable auxiliary to quinine, since it maintains at a high level the patient's organic resistance and thus helps in the development by the organism of anti-parasitic bodies.

3. It permits the suspension of quinine treatment when this is doing little good or is producing symptoms of intolerance.

F. S. A.

MICHAEL (W. H.). **Arsphenamine in Malaria.**—*U.S. Nav. Med. Bull.* 1920. Oct. Vol. 14. No. 4. pp. 643–644.

While arsphenamine, the name used in the States for the salvarsans, was being given in three cases for chancre or chancroid, there were three occasions on which paroxysms of malaria, diagnosed microscopically, were apparently actually precipitated by these injections ; while in two cases relapses continued irrespective of the injections. It is naturally concluded that " arsphenamine administered in 0·6 gm. doses intravenously has no valuable specific action in the treatment of malaria or in the prevention of relapses in the disease."

C. L.

i. D'ESTERRE (J. Norcott). **Notes on the Treatment of Recurrent Malaria by Novarsenobenzol.**—*Lancet.* 1920. Sept. 11. pp. 552–553.

ii. MURRAY (W. A.). **Novarsenobenzol in Malaria.** [Correspondence]. —*Ibid.* 1920. Oct. 2. p. 721.

D'Esterre and Murray were officers of the 3rd and 4th London General Hospitals respectively. D'Esterre reports twenty cases, of which only two seem to have been followed up for more than six months. In one of these latter, attacks, previously recurring fortnightly, recurred after treatment only six-monthly, but the man was hyper-sensitive to arsenic and developed a rash and acute asthmatic symptoms. In another instance acute exfoliative dermatitis followed the last injection given. Of the cases treated " 12 were Type B.T. and 8 Type M.T." In general the treatment consisted of four, weekly, intramuscular, gluteal injections of novarsenobenzol (B.W. & Co.) in 0·5 per cent. sterile saline, the first two injections being of 0·3 gm. in 5 cc., and the second of 0·4 gm. in 7 cc., the blood being examined for parasites before each injection, or, if none were found, for a large mononuclear increase. The writer was very gratified with the results he obtained.

Murray, working under the supervision of Sir Ronald Ross, notes that his experience is at a variance with that of d'Esterre. He reports eight cases of *Plasmodium vivax* and three of *P. falciparum* infection treated with three weekly intravenous injections of 4 gr. of novarsenobenzol, with quinine on intervening days. Within 50 days there

was relapse in six of the *P. vivax* and two of the *P. falciparum* cases, while two cases of *P. vivax* infection, treated with seven increasing weekly doses of kharsivan without quinine, also relapsed. He recommends sodium cacodylate as the most useful arsenical adjuvant to quinine.

C. L.

PAISSEAU (G.). **Paludisme et Novarsénobenzol.**—*Bull. Soc. Path. Exot.* 1920. July 7. Vol. 13. No. 7. pp. 502–504.

Using eight injections, the first six at weekly, the last two at fortnightly intervals, of 1·2 gm. of quinine and 0·15 gm. of novarsenobenzol, the former intramuscularly the latter intravenously, Paisseau has reached the following results and conclusions.

In 25 cases of *Plasmodium vivax* infections no attacks occurred and no parasites were found in the blood during the period of treatment. Seven of these cases were followed up for two months after treatment ceased; and of these, four relapsed within that time. Paisseau accordingly recommends a second course of treatment after a month's rest.

In *P. praecox* [*P. falciparum*] the same treatment was not always successful in keeping off fever, even while it was actually being carried out, and failed to remove crescents from the blood. The injections were accordingly increased to ten in all, eight of them being weekly, and 2 gm. of quinine were administered daily for the first 15 days. During the three months occupied by this modified treatment, no febrile attacks occurred, and crescents were absent from the blood after the first two or three weeks. A repetition of the treatment is recommended after a rest of a month, in the belief that this will give a period of remission of 6 to 7 months; this apparently representing the period actually covered by the treatments.

C. L.

DUPONT (V.). **Sur l'emploi de l'ionoïde d'arsenic dans le traitement du paludisme.**—*Bull. Soc. Path. Exot.* 1920. July 7. Vol. 13. No. 7. pp. 504–506.

Dupont urges the trial of Fouard's ionoïde of arsenic for malarial treatment, particularly in quinine-resistant cases. The drug is a colloid, put up in ampoules, and at normal temperatures consists of a clear fluid with brownish flocculi. When the ampoule is plunged in hot water these flocculi rapidly dissolve and the solution is used intramuscularly or intravenously. Intramuscular injections, even up to 3 cc., are painless; intravenous injections provoke no reaction. The treatment consists of ten doses of 2–3 cc. given every other day. FOUARD states that its non-toxicity is shown by an injection, without ill effects, of 15 cc. into a rabbit weighing 2 kg., and Dupont has himself injected 60 cc. into a syphilitic, without harm.

He has used the drug in 43 malarial cases and is more satisfied with it than with cacodylate of soda in doses ten times as great, whether given with or without quinine. He expresses inability to give exact figures but is satisfied that those who try it, particularly in extreme cachexial cases, will be gratified.

C. L.

Noronha (A. J.). **Organo-Therapeutic Treatment of Malaria.**—*Indian Med. Gaz.* 1920. Aug. Vol. 55. No. 8. p. 289.

Using, apparently in six cases, bazogen, a proprietory preparation which purports to consist of extracts of spleen, pancreas, thyroid and adrenal, there was found to occur a drop in temperature, sometimes at least not persisting beyond the period of administration. It is concluded as probable that beyond a temporary check on the activities of the parasites no special therapeutic action exists.

C. L.

Obrégia (A.). **Recherches sur l'action de l'urotropine en injection intraveineuse dans le paludisme.**—*Bull. et Mém. Soc. Méd. Hôpit. de Bucarest.* 1920. Sept. 30. No. 10. p. 239.

This preliminary note on the intravenous injection of urotropine in malaria is somewhat indefinite. Apparently it is of clinical value in stopping paroxysms and relieving anaemia ; but its effect on the parasites is unobserved, so that diagnosis is presumably uncertain. Three series of cases were observed. One received a single injection of 2 gm. in 5 cc. of distilled water ; the second two similar injections on consecutive days ; the third one injection of 3 gm. in 10 cc. The number of cases treated is not mentioned.

C. L.

Spanuth (Robert). **Hämoglobinbildung bei Malariarekonvaleszenten.** [Haemoglobin Formation in Malarial Convalescence].—*Arch. f. Schiffs-u. Trop.-Hyg.* 1920. Aug. Vol. 24. No. 7. pp. 209–214. With 1 text-fig.

The haemoglobin of 72 soldiers, suffering from their first attacks of malaria and under quinine treatment in a hospital in Roumania, was estimated weekly for seven weeks by Sahli's haemoglobinometer. It was found that in summer the reconstruction of haemoglobin proceeded much more rapidly than in autumn or winter. Of the summer cases some were given sun baths and some were not ; but the curves indicating the rate of reconstruction of haemoglobin are practically identical in both cases, that of those without sun baths however showing slightly better results. Nevertheless, after eliminating the effects of altitude, and because the author considered all the cases clinically identical, he confidently and emphatically concludes that the more rapid improvement in the summer cases was due solely to sunshine, and urges that all malarial cases should be put out in the sun and kept there. The possibility that these different results may be due to seasonable variations in the kind of malarial parasite implicated is not considered, no attempt at a microscopic diagnosis having apparently been attempted.

C. L.

Darling (Samuel T.). **Experimental Inoculation of Malaria by means of *Anopheles ludlowi*.**—*Jl. Experim. Med.* 1920. Sept. 1. Vol. 32. No. 3. pp. 313–329. With 3 charts.

Darling, of the Rockefeller Commission, convicts *Anopheles ludlowi* as a malarial carrier on the following evidence.

In the village of Gebongelir on the north shore of Java the splenic index was 97 and the parasitic index 29 per cent. Wild mosquitoes collected there were chiefly *Anopheles ludlowi*, and six out of fifty-eight of them contained malarial zygotes. From anopheles larvae, collected

in fish reservoirs, only *A. ludlowi* emerged, while of 121 wild specimens of *A. rossi* all proved on dissection to be free from malarial infection. A gamete carrier reliable for transference of infection had previously been shown to be one possessing twelve gametes per cmm., or one per five hundred leucocytes.

Forty *A. ludlowi*, reared from larvae, were fed on suitable carriers, and on subsequent dissection 52 per cent. of them were found infected. The salivary ducts appeared, however, so small that doubt arose as to whether they were large enough to emit sporozoits.

Accordingly six *A. ludlowi* similarly fed, and presumably similarly infected, were after the appropriate interval again fed, this time over a period of four days, on three uninfected persons. On the first day they were fed on Case 1, their feed being, however, interrupted and completed on Case 2. On the second and third days they were again fed on Case 1, and on the third day three of them also on Case 3. On the fourth day three of them fed again on Case 3. All cases developed malaria in from 14 to 18 days ; and two out of three survivors of these experimental mosquitoes still contained sporozoits when dissected on the termination of the experiment.

The experiments showed that *A. ludlowi* is an effective transmitter of malaria ; that infectivity can be retained after three bitings ; that when plasmodia were sufficiently numerous to be found in a single thick film (which contains about 1 cmm. of blood) they were sufficiently numerous to cause fever ; that symptoms were most marked in a subject never previously infected, and splenic enlargement greatest when reinfection followed a long period of freedom from infection ; and that first a tertian and then a quotidian type of fever followed upon a single, and presumably pure subtertian, infection.

Darling also emphasises the importance of ascertaining whether an Anopheles which feeds on man restricts itself to man or has more promiscuous tastes ; for species such as *A. umbrosus* and *A. tesselatus*, which feed also on fowls—*A. umbrosus*, *A. rossi* and *A. indefinitus*, which feed also on cattle—or *A. albimanus*, which enjoys horses' blood, will dissipate sporozoits in so feeding ; while a species with an obligate parasitic relationship to man, since it will not squander its parasites on hosts useless to them, will be correspondingly efficient and dangerous in disseminating human malaria.

C. L.

Blacklock (B.) & Carter (Henry F.). **Further Experiments with *Anopheles plumbeus* Stephens ; its Infection with *P. falciparum* in England ; also Notes on the Apparatus and Technique Employed.** —*Ann. Trop. Med. & Parasit.* 1920. Nov. 27. Vol. 14. No. 2. pp. 275–282. With 1 plate.

These experiments are a continuation of those reviewed in this *Bulletin* [Vol. 16. p. 341]. Twelve laboratory-bred female *Anopheles plumbeus* were fed on one of two cases of benign tertian malaria and kept at room temperature (13°—22° C.). None was infected on dissection. Twelve similar mosquitoes were fed once on a case of malignant tertian infection and kept at 28° C. ; one of them, killed on the eighth day, was found infected with oocysts in the midgut. The paper contains an account, which cannot be profitably abstracted, of the ingenious apparatus and technique used for breeding ; for the specific differentiation of pupae and the separation of adults ; and for the feeding of larvae and adults.

C. L.

Mesnil (F.) & Roubaud (E.). **Essais d'inoculation du paludisme au chimpanzé.**—*Ann. Inst. Pasteur.* 1920. July. Vol. 34. No. 7. pp. 466–480. With 1 chart in text and 1 plate.

This very interesting paper, with its accompanying coloured plate of parasites in blood smears, describes eight experiments in which citrated blood infected with *Plasmodium praecox* was injected into two chimpanzees, and two experiments in which these animals were bitten by infected *A. maculipennis*. Of the latter series all were negative ; of the former there occurred in one case after ten days an infestation which again lasted for ten days and then died out naturally, thus constituting the first instance in which human malaria has been transmitted to any host other than man. The writers do not press the possibility of the experiment being of significance in practical hygiene.

C. L.

Donovan (C.). **Malaria of Monkeys at the Foot of the Nilgiris during the Months of May and June, 1919.**—*Indian Jl. Med. Res.* 1920. Apr. Vol. 7. No. 4. pp. 717–721. With 1 plate.

Donovan having found *Plasmodium pitheci* in the orang-outang, *P. kochi* in *Cercopithecus* sps. and *P. cynomolgi* in *Macacus cynomolgus* (closely allied to *M. sinicus*), made the attempt to determine whether the malaria of man, contracted in jungles where no human beings are said to dwell, was not attributable to infection from monkeys. In such a locality, situated in the forest to the north-west of Ootacamund, he shot and examined 76 *M. sinicus* and 10 *Presbytis priamus*, and found no malarial parasites of any kind. What he did find in these supposedly man-free jungles were several jungle-people wandering about in the remotest parts and themselves possessing active or passive malarial infection. He also found that the Malabar squirrel, *Ratufa indica malabarica*, commonly harbours a plasmodium very like *P. vivax* of man, and notes that Manson has suggested that cave-dwelling bats may have been the original source of human malaria. An appended note adds that a slide of the blood of *M. sinicus* sent him from a valley adjoining the area he investigated contains a plasmodium morphologically identical with that contained in the blood of *M. cynomulgus*.

C. L.

Reichenow (Eduard). **Ueber das Vorkommen der Malariaparasiten des Menschen bei den afrikanischen Menschenaffen.** [Occurrence of the Malaria Parasites of Man in African Anthropoid Apes.]—*Cent. f. Bakt.* 1. Abt. Orig. 1920. Nov. 1. Vol. 85. No. 3. pp. 207–216. With 3 text-figs. and 1 plate.

The writer's observations lead him to the confident assertion that all the malarial parasites of man occur in the gorilla and chimpanzee in West Africa, and that anthropoid apes are as sure a source of danger to Europeans living in those parts as are negroes. The grounds of his confidence are as follows. He finds in these apes a parasite which he identifies with *Plasmodium vivax* and not with *P. kochi* in that the containing erythrocyte is enlarged by it. Although never obtaining a case of pure infection or of a single generation he is certain that the cycle is one of 48 hours. The parasite forms twelve merozoits.

In regard to quartan forms he has equally found no single or pure infection, but unhesitatingly describes as *P. malariae* parasites contained in unenlarged erythrocytes, with dark pigment and apt to take a band-like form.

He claims further to have found rings and crescents of subtertian malaria, the former never unassociated with the other two forms, the latter kidney-shaped, sausage-shaped or sickle-shaped, corresponding, he says, to the forms found in man in these parts.

Schizogony he found relatively common in the peripheral blood in apes, and although he notes that ZIEMANN states that such is practically never the case in man in West Africa his confidence in the unity of species is not thereby influenced. It seems clear that Reichenow's own observations render it at present wise to exercise a cautious hesitation in the acceptance of his conclusions.

C. L.

GOSIO (B.). **Science and Practice in the Fight against Malaria.** — *Internat. Jl. Public Health.* 1920. Sept. Vol. 1. No. 2. pp. 178–187.

The Director of the laboratory in the Public Health Department of Rome makes an appeal for patience and renewed energy in the long fight against malaria in view of difficulties now more appreciated than used to be the case. He points out the practical difficulties in the social problem; that associated with certain disinfestation and prophylaxis by drugs; the uncertainty as to the latter's always being harmless, especially to children; and the impossibility of enforcing treatment, even if it were made compulsory by law. He envisages an expert directing body which will attack the problem only after mature local investigation, without preconceived ideas and with overwhelming forces.

C. L.

SELLA (Massimo). **The Antimalaria Campaign at Fiumicino (Rome), with Epidemiological and Biological Notes.** —*Internat. Jl. Public Health.* 1920. Nov. Vol. 1. No. 3. pp. 316–346. With 6 figs. and 1 folding plan.

An anti-malarial campaign in a village of 700 inhabitants produced a practically complete disappearance of primary infections. It entailed (1) the identification by blood examination of all infestations and their disinfestation by the prolonged administration of quinine, a matter on which great stress is laid; (2) an anti-larval campaign which, without other measures, is considered ineffective; (3) a destruction of adult anopheles either during the summer or while hibernating, as in the case of *A. claviger*, the trapping of which cuts down the swarm of intermediaries which accompanies the hatching of the first batch of eggs. Besides trapping, the adults may be destroyed by hydrocyanic acid in a strength of 0·02–0·03 per cent., which corresponds, in a space not completely closed, to 0·5 to 1 gramme of sodium cyanide per cubic metre of air space. The good influence of a zone of stables or pigsties as an attractive diversion for anophelines, and a protection for man, is mentioned.

C. L.

i. CUADRA (A.). [Congenital Malaria.]—*Arch. de Méd. des Enfants.* Paris. 1920. Oct. Vol. 23. No. 10. p. 606. [Summarised in *Jl. Amer. Med. Assoc.* 1920. Nov. 20. Vol. 75. No. 21. p. 1455.]

ii. NEUMANN (Alfred). Zur Diagnose der chronisch-latenten Malaria.—*Mitteil. d. Volksgsndhtsamt.* 1920. July 25. No. 13. pp. 476–477.

i. Cuadra reports from Nicaragua a case in which a malarial mother had a typical paroxysm with rigor and fever, and the new-born child a temperature of 104° at the same time, *Plasmodium vivax* being "cultivated" from the blood of both. Under quinine both recovered.

ii. A painstaking investigation leads to the conclusion that an enlarged spleen is evidence of malaria.

C. L.

PELLAGRA.

i. Woodcock (H. M.). **Helminthic Infections in Relation to Pellagra.** —*Lancet.* 1920. May 29. pp. 1193–1195.

ii. Goldberger (J.). **The Pellagra Outbreak in Egypt.**—*Ibid.* July 3. pp. 41–42.

iii. Bigland (A. Douglas). **The Pellagra Outbreak in Egypt.**—*Ibid.* July 10. pp. 98–99.

iv. Lelean (P. S.). **Pellagra.**—*Ibid.* July 17. pp. 156–158.

v. Woodcock (H. M.). **Helminthic Infections and Pellagra.**—*Ibid.* Aug. 7. p. 320.

vi. Wilson (W. H.). **The Pellagra Outbreak in Egypt.**—*Ibid.* Oct. 2. pp. 719–720.

vii. Burridge (W.). **Pellagra among the Prisoners in Egypt.**—*Ibid.* Oct. 9. pp. 764–765. [Correspondence in each case.]

The outbreak of pellagra among Ottoman and non-Ottoman prisoners of war in Egypt occurred during the period 1916–1919. Three independent investigations were undertaken during that time. In chronological order these were :—

(1) Work upon Turkish cases only, by Dr. A. D. Bigland [see this *Bulletin*, Vol. 16, p. 68].

(2) An investigation also upon Turkish cases by the Pellagra Commission [see this *Bulletin*, Vol. 15, p. 52].

(3) Observations upon pellagra among German prisoners of war, by Dr. J. I. Enright [see this *Bulletin*, Vol. 16, p. 70].

The publication of these papers called forth a prolonged correspondence in the *Lancet* which is here presented in chronological order and briefly summarised.

i. Woodcock undertook the protozoological work for the Egyptian Pellagra Commission. He was struck by the prevalence of helminthic infections, especially of ascaris, among the pellagrins. In a closely reasoned argument he suggests that such an infection may produce the hypothetical toxin invoked by Bigland in his etiological remarks. In support of this he states that ascaris infection was extremely rare among British troops in Egypt and correlates this with the fact that pellagra was unknown amongst them.

ii. Goldberger adverts chiefly to the outbreak among the Germans and to Dr. Enright's suggestion that a diet deficiency alone could not account for the disease owing to the good dietetic conditions obtaining in these cases. Dr. Goldberger asks the question "Did these prisoners actually eat the adequate diet that Dr. Enright believes they did ?" He maintains that the answer to this question is in the negative. The pre-capture diets were not described and even the post-capture diets were only "furnished" and not necessarily "consumed." He continues, "since the number of cases of scurvy and of those of pellagra were relatively very few, it is fairly certain that the diet allowed was adequate so that such faults as developed were probably the result either of improper distribution or of individual eccentricities of taste or, perhaps, of both." Bigland's toxin hypothesis is regarded as superfluous.

iii. Bigland replies to Dr. Goldberger's letter and asks, Will Dr. Goldberger explain why certain of the prisoners would not eat ?

The various associated diseases were common to all so that no argument on those lines was of avail. Surely the only answer is that these prisoners did not eat because they did not want to, being in the pre-eruptive stage of the disease ; or having eaten could not assimilate their food for the same reason. The delicacy of the German with regard to his food is ridiculed. A recent case under the writer's observation in England is described to show that diet deficiency is not the only etiological factor.

iv. After having laid great stress upon the unreliability of Dr. ENRIGHT'S account of the German pre-capture diet Lelean states that anyway the question does not apply to 70 per cent. of the cases since these must have commenced the disease after capture. He then goes on to discuss the prisoners' rations in camps and hospitals. He states two facts (1) That there is no evidence to show that the prisoners ate the diet presented to them, and (2) that mal-assimilation was present.

v. In this letter Woodcock resents LELEAN'S remarks regarding his (Woodcock's) statement that helminthic infection is the determining cause in pellagra. What this writer intends to say is that " the greater the adverse effect of helminthic intoxications the less would be the degree of dietetic deficiency which would suffice to produce suprarenal inadequacy and pellagra and vice versa."

vi. Wilson himself summarises his remarks as follows :—

1. " The majority of the German prisoners of war in Egypt lived solely on the camp rations.
2. " The value of the rations was probably less as issued than the estimated value.
3. " Those who contracted pellagra were not in normal health and their protein requirement was raised thereby.
4. " The protein requirement was raised by the deficient energy value of the diet."

vii. Attention is drawn by Burridge to the fact that in the present discussion too much attention has been paid to deficiency in certain amino-acids and not enough to deficiency in actual calories. The presence of night blindness among the prisoners was also commented upon.

A. D. Bigland.

BOYD (Francis). **Pellagra.**—*Edinburgh Med. Jl.* 1920. June. N.S. Vol. 24. No. 6. pp. 366–371. With 3 plates.

This article is practically an outline in lecture form of the work done by the Egyptian Pellagra Commission of which the author was a member. The findings of the Commission have already been discussed in a previous issue of the *Bulletin*. [Vol. 15. pp. 52–53.]

A. D. B.

WOOD (Edward J.). **The Etiology of Pellagra from the Standpoint of a Deficiency Disease.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1920. May 21. Vol. 14. No. 1. pp. 1–7.

The various theories regarding the etiology of pellagra are discussed, particular attention being paid to the recent work done in America and in Egypt. Reference at some length is made to the process of milling various grains and the ills arising therefrom. It is stated that " if pellagra is a deficiency disease it may occur as often among those who eat wheat as among those who eat maize as the exclusive cereal diet."

The author then says "it is not a question so much of the particular cereal as it is of the portion removed in the milling." Water-soluble B appears to be the absent factor in this case. Prompt improvement resulted in pellagrins fed with the whole grain of maize even in cases in which a diet liberal in milk and eggs had been tried without result.

"If the problem is one simply of a too low protein level, or a too low biologic protein, there are many classes of sufferers that cannot be reached. If, however, we can finally determine that water-soluble B is the deficient element, it can readily be supplied at small cost." In conclusion the infective theory of pellagra is discussed.

[It is a great pleasure to read this paper embodying as it does the mature reflections and helpful criticisms of a master in the subject.]

A. D. B.

White (R. G.). **Report on an Outbreak of Pellagra amongst Armenian Refugees at Port Said, 1916–1917.**—*Reports and Notes of the Public Health Laboratories, Cairo, Egypt.* 1919. No. 2. pp. 1–46. With 4 plates, 3 plans, 3 charts, and 2 maps.

On July 30, 1915 the Armenian inhabitants of six villages near Antioch were ordered by the Turkish Government to leave their homes. About 5,000 people obeyed the order. After great hardships 4,058 refugees, of whom 700 were adult males, arrived at Port Said, where they were housed in a special camp prepared for them. Official rations were issued in Sept. 1915 and again Feb. 1916, during which time the men were trained for military service and the women employed about the camp. In March 1916 symptoms of pellagra showed themselves, i.e. stomatitis and diarrhoea, though the disease was only definitely diagnosed in May 1916. In June of that year from 400 to 500 of the refugees showed signs of the disease. Of 1,200 children attending school only 50 presented symptoms of pellagra and these were but slight. During July 1916 the people began to work for themselves and were able to earn money with which to buy extra food, with the result that the incidence of the disease diminished. But this state of affairs did not last and the men returned to camp; in September 1916 a fresh outbreak occurred. In Feb. 1917 another official diet was issued with a special anti-pellagrous ration for those affected. In May 1917 there were only 14 cases in hospital and 13 attending as out-patients. After this date no new cases were seen.

The following facts are also worthy of note:—

These refugees came from a district where pellagra is unknown; for six months after their arrival in Port Said their diet was very deficient, the staple article of food being bread made from flour of which 25% was derived from maize. Six months after their arrival in Egypt pellagra broke out. The average duration of the illness was five months. The number of cases in 1916 was 639, and in 1917 14. Thirty-eight cases died, a percentage of 5·8 of those who had the disease.

The particulars as to diet are as follows:—

The first camp diet contained 47·6 grms. of protein (95% from vegetable sources) giving a protein biological value of only 23. This scale continued with slight alterations until Oct. 1916 when the total protein was increased to 67·7 grms. which gave a biological value of 32·3. In Feb. 1917 the total protein for non-pellagrous persons was 75·2 grms. (biological value 46·5) while that for pellagrous patients was 83·0 grms. (biological value 59·6). These rations were augmented by the work of the refugees and by the aid of charities.

The Jew Refugee Camp at Alexandria did not present a single case of pellagra. In this community the diet from the beginning was supplemented by food bought by the refugees themselves or supplied by charities.

Many pathological investigations were carried out with results agreeing in the main with those of other workers.

One fact is worthy of note, viz. that in the blood picture the Arneth curve showed a marked "shift to the left."

The author is certain that this outbreak of pellagra was caused by faulty diet and cured by correcting this fault, all the other conditions remaining the same. There was nothing of a protozoal nature discoverable in the etiological factors nor had sanitation, the water supply, nor biting insects any connection with the outbreak.

[This paper has been abstracted at some length because it gives a beautiful picture of a pellagra outbreak from its origin to its close. Undoubtedly the author has proved his case that in this outbreak at any rate a food deficiency was to blame.

After the outbreak had disappeared, by permission of the Authorities, the reviewer visited the Camp at Port Said and made a careful inspection of the refugees. He saw no trace whatever of pellagra and in only one instance was he able to state that one of the Armenians presented "relics" of the disease. This was a young girl who showed marked oedema of the legs. On looking up the records it was found that she had been in hospital previously with pellagra. Oedema occurring in some cases is mentioned in the report here summarised.]

A. D. B.

Miller (R. S.) & Ismail (Ahmed Chafick). **Pellagra and the Pellagra Psychosis. A Study of 757 Insane Egyptian Pellagrins.**—*Lancet.* 1920. Oct. 16. pp. 788–789.

The cases were studied at the Khanka Mental Hospital. This hospital was opened upon Jan. 1, 1912 and since that date 2,738 male certified cases were received of which 757 (27·6%) showed signs of pellagra on admission.

The well-known fact that pellagra is less common in Upper than in Lower Egypt is referred to and confirmed. Mention is made that in Upper Egypt millet largely replaces maize in the diet. The authors are of the opinion that the disease makes its initial attack about puberty.

The fellahin class in Egypt is that in which pellagra is most commonly found. The rash is usually on the feet, 46%, and on the hands, 40%. In 10% of cases a bilateral parotitis was observed.

On admission 27% of these cases were definitely suicidal and 25% doubtfully so; 57% of all the cases were definitely "dangerous" and 18% doubtfully so. 42% of the cases were classified under the heading "'Amentia,' the typical psychosis of the earlier stages." Dementia is the terminal mental condition.

As regards subsequent history—32% died, 47% were discharged and 21% remained under treatment. Dr. Dudgeon, the director of the Khanka Mental Hospital, is quoted as saying, "Once a pellagrin always a pellagrin."

[The bilateral parotitis here mentioned was noted by Enright among the pellagrous prisoners of war in Egypt.]

A. D. B.

GOLDBERGER (Joseph) & WHEELER (G. A.).

i. **Experimental Pellagra in White Male Convicts.**—*Arch. Intern. Med.* 1920. May. Vol. 25. No. 5. pp. 451–471.

ii. **The Experimental Production of Pellagra in Human Subjects by Means of Diet.**—*Hyg. Lab. Bull.* 1920. Feb. No. 120. pp. 7–116. With 14 text-figs. and 2 charts.

i. This paper appeared in shorter form in 1915 [see this *Bulletin.* Vol. 7. p. 51]. Since then the results obtained have been quoted all the world over. The present work is an amplification of the original paper.

The experiment may be tabulated as follows :—

Eleven healthy white adult male convicts were chosen from among 108 convicts at Rankin Farm, Mississippi Penitentiary. They were subjected to a monotonous, chiefly cereal, diet. The conditions remained the same throughout the experiment except for this diet restriction. Work was undertaken by these convicts but to a less degree than formerly. The other convicts on the farm served as " controls."

The study falls into two periods—one from Feb. 4, 1915 to April 19, 1915 during which the subjects of the experiment were under observation and living upon ordinary prison fare ; the second period from April 19, 1915 to Oct. 31, 1915 during which the experimental diet was in action.

The ingredients of this experimental diet were highly milled wheat flour, maize meal and grits, corn starch, white rice, cane sugar, cane syrup, sweet potatoes, pork fat, cabbage, collards, turnips, turnip greens, coffee, " Royal " baking powder, salt and pepper. During the first three months buttermilk was used in making wheat biscuits.

Significant subjective symptoms made their appearance among the volunteers during the second month after beginning the test diet. These included weakness, abdominal discomfort or pain and headache. All subjects lost weight, the loss becoming particularly marked during the last four weeks of the experiment. At least six of the eleven men developed a well marked eruption. The earliest date for the beginning of this was September 12, or at about the end of the fifth month of the diet. The initial site in all of the cases was the scrotum ; later classical lesions also developed in one on the hands and in another on the neck.

None of the controls developed pellagra.

Attention is particularly directed to the scrotal lesion and an attempt is made to correlate the site of the lesion with the type of diet.

[This paper is certainly a " classic " already. It is quoted by every writer on pellagra unless the particular axe he may have to grind is not a food deficiency ; in which case GOLDBERGER's work is passed over in silence. It appears to be proved beyond doubt that the six convicts developed the disease on a very restricted protein diet. An attempt has been made in certain quarters to question the clinical diagnosis of pellagra in these cases. It may be said, however, that the observers are well acquainted with the disease and have confirmed their results with the aid of consultants. This work is a beautiful example of pellagra occurring in a food deficiency which came from without the patient and not from within. In one of the writer's Turkish cases also the rash was present on the scrotum.]

ii. Another and somewhat fuller account of the Rankin Farm experiments. Little new is added except a series of excellent photographs showing the scrotal dermatitis.

A. D. B.

Oppenheim (Moritz). **Ueber pellagraähnliche Hauterkrankungen unter der Bevölkerung Wiens.** [Pellagra-like Skin Diseases among the Population of Vienna].—*Wien. Med. Woch.* 1920. July 24 & 31. Vol. 70. Nos. 30–31 & 32. pp. 1326–1366, 1406–1409.

Three typical cases of early pellagra occurring at Vienna in the spring and summer months are described in great detail. Two were males and one female. The description of the rash and the diarrhoea and a history of poor nourishment are unmistakable. Yet the author prefers to call the cases "pellagroid" and not true pellagra. The reason for this apparently is that he saw one pellagrin coming from Italy (probably a chronic case) and was unable to see the exact resemblance between this case and his own. No mention is made of stomatitis. All the cases got well rapidly, mostly with the help of arsenic. The various etiological theories of pellagra are discussed but the author could not make any of them fit in with his cases. As regards the photodynamic theory it was found that Finsen light made no alteration in the skin lesions. Sections of skin were removed from one case and studied histologically. Food deficiency cannot be the cause of the disease because most of the population lived upon a staple diet of cabbages, turnips and bread and therefore all ought to have contracted the disease.

[It is most interesting that pellagra should have been found in Vienna because on *a priori* grounds it was to be expected. Those who have seen much of the disease cannot fail to be struck by the fact that though many persons may be subjected to deficient diet only a certain number develop pellagra. Undoubtedly there is another factor in operation.]

A. D. B.

Wheeler (G. A.). **Pellagra in the Mountains of Yancey County, North Carolina.**—*Public Health Rep.* 1920. Oct. 22. Vol. 35. No. 43. pp. 2509–2514.

The author states that cases of pellagra which had originated in the Mountains of North Carolina were observed. These cases coming from an altitude of 3,000 feet and higher showed no marked differences from ordinary low level cases. In each case diet had been restricted, especially as regards meat, of which little or none was eaten.

A. D. B.

Goldberger (Joseph), Wheeler (G. A.) & Sydenstricker (Edgar). **A Study of the Relation of Diet to Pellagra Incidence in Seven Textile-Mill Communities of South Carolina in** 1916.—*Public Health Rep.* 1920. Mar. 19. Vol. 35. No. 12. pp. 648–713. With 7 text figs.

The investigation is a supplement to the purely experimental work done on convicts at Rankin Farm. It is a study of pellagra diets in those cases where the disease has occurred naturally. For this purpose typical cotton-mill villages of South Carolina each having an average of 650 inhabitants were investigated.

The results were as follows:—The pellagra cases lived upon diets restricted in "animal protein." Increase in supplies of milk and fresh meat independently lessened pellagra incidence. No evidence in favour of the zeist theory was forthcoming. The potential energy of the diets

was not appreciably different in pellagrous and non-pellagrous households. A deficiency in total protein did not appear to be an essential factor in the incidence of the disease, but in pellagrous houses the protein supply was derived largely from cereals, beans and peas. As regards carbohydrates and fats no marked differences were found between healthy and pellagrous households ; vitamine supply, however, was less in pellagrous houses.

The practical outcome of this research is to increase supplies of milk and fresh meat as much as possible in pellagrous regions.

A. D. B.

Goldberger (Joseph), Wheeler (G. A.) & Sydenstricker (Edgar). **Pellagra Incidence in Relation to Sex, Age, Season, Occupation and "Disabling Sickness" in Seven Cotton-Mill Villages of South Carolina during** 1916.—*Public Health Rep.* 1920. July 9. Vol. 35. No. 28. pp. 1650–1664. With 3 text figs.

Seven cotton-mill villages of South Carolina were investigated from the point of view of pellagra incidence and resulting "disabling sickness." 26·1 per 1,000 definite cases were recorded, increased to 42·7 per 1,000 if "suspects" were included. The disease is rare in children under two years of age. Among both males and females up to 20 years the incidence is similar, being higher from 2 to 10 than from 10 to 19 years inclusive. From 20 to 25 the incidence is much higher among females. The season of onset was almost entirely April to September, reaching its height in June. The pellagra rate was considerably higher in non-mill workers both males and females. While the pellagra rate was four times greater in non-mill workers the rate for disabling sickness was higher among mill workers ; these figures refer to females only.

A. D. B.

Goldberger (Joseph), Wheeler (G. A.) & Sydenstricker (Edgar). **A Study of the Relation of Factors of a Sanitary Character to Pellagra Incidence in Seven Cotton-Mill Villages of South Carolina in** 1916.—*Public Health Rep.* 1920. July 16. Vol. 35. No. 29. pp. 1701–1714. With 1 chart in text.

A study carried out in seven representative mill villages in South Carolina shows no relation between sanitation and the incidence of pellagra. No evidence was found to substantiate the infection theory of the disease.

A. D. B.

Voegtlin (Carl). **Recent Work on Pellagra.**—*Public Health Rep.* 1920. June 18. Vol. 35. No. 25. pp. 1435–1452. With 1 map.

The author draws the following conclusions :—

(1) "The hypothesis that there is a causal relation between pellagra and a restricted vegetable diet has been substantiated by direct proof to this effect and has led to results of considerable practical and scientific value.

(2) "The metabolism in pellagra shows certain definite changes from the normal, which point to decreased gastric secretion and increased intestinal putrefaction.

(3) "In the treatment and the prevention of pellagra, diet is the essential factor. The disease can be prevented by an appropriate change in diet without changing the other sanitary conditions.

(4) "A diet of the composition used by pellagrins prior to their attack by the disease leads to malnutrition and certain pathological changes in animals, resembling those found in pellagra. A typical pellagrous dermatitis has not been observed in animals. Pellagrous symptoms have been produced in man by the continued consumption of a restricted vegetable diet.

(5) "The nature of the dietary defect has not been discovered, although certain observations point to a combined deficiency in some of the well-recognized dietary factors as the cause of the pellagrous syndrome."

A. D. B.

McCollum (E. V.). **Relation of the Diet to Pellagra.**—*Proc. Amer. Phil. Soc.* 1919. No. 58. pp. 41–54. [Summarised in *Abstr. of Bact.* 1919. Dec. Vol. 3. No. 6. pp. 360–361.]

The author discusses "protective foods" (milk, eggs, leafy vegetables), food hormones, inorganic constituents and the quality and amount of protein in its relation to pellagra etiology. He criticises results derived from human experiments in diet carried out for a few weeks or months on grown men. Good results can be obtained, however, from observations on large numbers of people living on a restricted diet. Animals are more suitable than men for diet experiments because the former can be brought under more rigid conditions and have a shorter span of life.

The author was unable to produce in animals any condition resembling pellagra. The disease, he thinks, is due to an infection but faulty diet may increase susceptibility to it.

A. D. B.

Goldberger (Joseph). **Some commonly Misapprehended Points in the Diagnosis of Pellagra.**—*Milit. Surgeon.* 1920. July. Vol. 47. No. 1. pp. 94–99.

The validity of the diagnostic triad "Dermatitis, Diarrhoea, and Dementia" in pellagra is called in question. Diarrhoea is not always or even usually present, while the dementia occurs only in late cases and can therefore be warded off by suitable diet.

Dermatitis need not be symmetrical as is usually taught and may appear on non-exposed surfaces. There is no real evidence that the sun's rays bring out the rash.

A. D. B.

Roberts (Stewart R.). **Types and Treatment of Pellagra.**—*Jl. Amer. Med. Assoc.* 1920. July 3. Vol. 75. No. 1. pp. 21–26.

In the last twenty years probably 500,000 cases have occurred in the United States. The death roll is probably 50,000. The author is an ardent supporter of the food deficiency hypothesis and quotes many cases in proof thereof. In treatment "diet is of consuming importance," and two tables are given showing the regime during the attack and between whiles. Drugs are of minor importance.

[All those who have tried to make pellagrins eat and failed will be delighted with the author's phrase "diet is of consuming importance"!]

A. D. B.

Roaf (H. E.). **A Contribution to the Pathology of Pellagra.**—*Jl. Roy. Army Med. Corps.* 1920. June. Vol. 34. No. 6. pp. 534–538.

The material for this work was obtained from cases of pellagra occurring among Turkish prisoners of war in Egypt. Particular attention was paid to the adrenal glands and to the sympathetic

nervous system. As regards the adrenals for the most part some abnormality was found, these glands being "lighter" in pellagra than in other wasting diseases. As regards the sympathetic nervous system it was found that in four cases the ganglion cells were plasmolysed so that large spaces with small shrunken cells were found.

The author pleads for further work along these lines, especially in more chronic cases.

A. D. B.

Chick (Harriette) & Hume (Eleanor Margaret). **The Production in Monkeys of Symptoms closely resembling those of Pellagra by Prolonged Feeding on a Diet of Low Protein Content.**—*Biochemical Jl.* 1920. April. Vol. 14. No. 2. pp. 135–146. With 1 fig. and 1 plate

In this work an attempt is made upon a small scale to ascertain whether monkeys fed upon a diet of low protein content will develop symptoms of pellagra.

As regards the diets the following points are to be noted:—Ample accessory food factors were supplied as butter, marmite and orange juice, while the main diet consisted of sugar, cornflour, salt and corn gluten. A small daily ration of apple or banana was given as a relish. The corn gluten was almost the sole source of protein.

Varying amounts of the above substances were given in three different diets. Diet I. = Total protein 23 grms.; total protein other than zein 7·3 grms. Diet II. = Total protein 15 grms.; total protein other than zein 5 grms. Diet III. = Total protein 8·2 grms.; total protein other than zein 2·9 grms.

Three monkeys of the species *Macacus rhesus* were chosen. They rejoiced in the names of Lazarus, Diana and Jonathan.

Lazarus and Jonathan lost weight on Diet I. and were therefore retained on it till death, which occurred in the case of Lazarus after 92 days and of Jonathan in 195 days. Diana kept her weight on Diet I. for 90 days and on Diet II. for 26 days. It was not until she received Diet III. that any serious loss of weight took place. The monkeys on Diet I. showed only incipient symptoms and appeared to be suffering from starvation. Diana, however, on Diet III. developed skin symptoms closely resembling those of pellagra in the human subject both in symmetry and in behaviour to sunlight. The rash was of the wet type. Diarrhoea was only noted in Lazarus, who was subject to it before the experiments began. No nervous symptoms appeared.

Attempts were made to cure these monkeys by exhibition of three different substances: (1) Tryptophan—this failed in one case, staved off death for many weeks in one case and slightly modified the symptoms in one case. (2) A mixture of Lysine, Arginine and Histidine—this was tried only in one case and had but little effect. (3) Caseinogen (5–10 gm.) failed in one case, gave little added benefit in the second, but "brought about a dramatic cure in the case in which the skin lesions were most severe." Later, 17 days after Diana had returned to normal diet and was gaining weight, she began to have convulsions and died shortly afterwards. Post mortem examination showed apparently healthy organs.

The coloured plate accompanying the paper shows the appearance of the skin lesion which, it must be admitted, bears a strong resemblance to pellagra. This work is certainly worthy of performance on a large scale.

A. D. B.

i. Sullivan (M. X.) & Jones (K. K.). **The Chemical Composition of the Rankin Farm Pellagra-Producing Experimental Diet.**—*Hyg. Lab. Bull.* 1920. Feb. No. 120. pp. 117–126.

ii. Sullivan (M. X.). **A Biological Study of a Diet Resembling the Rankin Farm Diet.**—*Ibid.* pp. 127–140.

iii. **Feeding Experiments with the Rankin Farm Pellagra-Producing Experimental Diet.**—*Ibid.* pp. 141–156. With 6 figs.

iv. Sullivan (M. X.) & Stanton (R. E.). **The Alkali Reserve in Pellagra.**—*Arch. Intern. Med.* 1920. July 15. Vol. 26. No. 1. pp. 41–48.

i. The object of the work is to discuss "the broad chemical composition of the diet" upon which the Rankin Farm convicts developed pellagra. It is impossible in a short abstract to give the long tables of diets described in this paper. Perhaps it will suffice to give a sample of the diet consumed per man per day during the week ending Aug. 8, 1915.

Protein	=	40·36 gms.
Carbohydrates	=	461·58 gms.
Fat	=	108·76 gms.
Ash	=	29·99 gms. (6·81 gms. in foodstuffs. 23·18 gms. added as common salt, baking powder and baking soda.)

ii. A study of the Rankin Farm pellagra-producing diet is presented from a vitamine point of view.

Experiments were conducted along two lines—(*a*) The diet was dried on the water bath and kept in an oven at 80° C. (*b*) The same diet complex was made up fresh every three days and fed.

Experiments (*a*) resulted in polyneuritis in fowls as did also experiments (*b*). As regards pigeons apparently both diets produced toxic effects before neuritic symptoms had time to appear.

"Local water-ground corn meal" was then substituted for the corn meal of experiment (*a*). On this diet six of the ten hens showed polyneuritis in from 41 to 174 days. The change of corn meal lengthened the time required to produce marked polyneuritis from an average of 50 days in the previous experiment to an average of 85 days. Four of the ten hens showed some skin changes, viz. reddening of the feet and of the skin of the sternum.

iii. Further work was done upon the pellagra-producing diet and its effects upon certain animals.

"It is certain from the results outlined in this report that pigeons, hens, and rats are affected differently by the Rankin farm diet. For the pigeons, the diet was evidently toxic; for hens it was primarily lacking in the anti-neuritic principle; for rats it was still further lacking for maintenance and growth. None of these animals showed pellagra-like symptoms such as a reddening of the skin, though on the diet as such all gave evidence of serious malnutrition."

iv. "Of the fifty-six patients tested for alkali reserve by the alveolar air method and by the determination of the carbon dioxide bound by the blood plasma, none showed a marked depletion of the alkali reserve, about one-third showed a slightly subnormal level, while the greater number were within normal limits. There would seem to be little uncompensated acidosis in pellagra."

A. D. B.

Bory (Louis). Contribution à l'étude de l'origine de la pellagre.—*Progrès Méd.* 1920. Oct. 23. No. 43. pp. 461–462.

The author has seen two cases of pellagra and hastens to write an essay. One of the cases was that of an Italian soldier who came from a district where pellagra is endemic. The second case occurred in a French town some weeks after Italian soldiers had been billeted there. The possibility of infection in these cases is discussed and so the contribution finishes.

A. D. B.

Low (R. Cranston) & Yellowlees (Henry). A Case of Pellagra.—*Edinburgh Med. Jl.* 1920. Nov. Vol. 25. No. 5. pp. 315–316.

An asylum inmate, a married woman aged 47, developed a typical pellagrous eruption after exposure to the sun. There were no other definite symptoms except the mental condition and the rash disappeared in seventeen days. This was apparently the first attack. No mention is made of diet and no laboratory investigations are recorded.

A. D. B.

YELLOW FEVER.

Noguchi (Hideyo). **Etiology of Yellow Fever. XII. Chemotherapy *versus* Serotherapy in Experimental Infection with *Leptospira icteroides*.**—*Jl. Experim. Med.* 1920. Oct. 1. Vol. 32. No. 4. pp. 381–400.

A series of experiments was devised to test the action of salvarsan and neo-salvarsan on *Leptospira icteroides*. As infection of guinea-pigs with this organism is very irregular it is difficult to gauge the effect of any drug. From a long series of experiments in which allowance was made for this source of error the writer concluded that it is extremely doubtful if the two drugs mitigated the severity of the infection in any way. In some cases the treated animals died sooner than the controls, suggesting that a possible injury to the kidney by the drug gave the leptospira an easier and earlier access to this organ.

Test-tube experiments showed that these drugs in dilutions of 1 in 200,000 killed the leptospira in 18 hours and a similar dilution suppressed the growth when added to culture medium.

The serum from a rabbit which had received 0·05 gramme of salvarsan or neo-salvarsan per kilo of body weight 1 hour before bleeding proved to behave very differently from a normal serum when tested against the leptospira. In the serum of the treated rabbit *Leptospira icteroides* remained active for at least 1 hour, were sluggish after 18 and dead and degenerated in 48 hours. In normal serum multiplication took place during the period of observation. The same result was obtained by adding the drug directly to the serum and keeping it standing for 72 hours. The author concludes that it is evident that salvarsan and neo-salvarsan are present in the blood serum drawn at the end of 1 hour and that it has a slowly operating injurious effect upon *Leptospira icteroides*. The action, however, appears to be too slow to affect the course of a rapidly developing disease like yellow fever.

In direct contrast to the action of these drugs attention is drawn to the anti-icteroides immune horse serum, which in a dose of 0·0001 cc. or 1 cc. of a 1 : 10,000 dilution protects guinea-pigs against at least 5,000 minimum lethal doses of leptospira when injected simultaneously. The same serum mixed with the organism *in vitro* in a dilution of 1 : 2,000 failed to influence it injuriously. Rapid disintegration, however, occurred with dilutions of 1 : 20 and complete agglutination with 1 : 200.

C. M. Wenyon.

i. Noguchi (Hideyo) & Kligler (I. J.). **Experimental Studies on Yellow Fever occurring in Merida, Yucatan.**—*Jl. Experim. Med.* 1920. Nov. 1. Vol. 32. No. 5. pp. 601–625. With 19 charts in text.

ii. **Immunological Studies with a Strain of Leptospira isolated from a Case of Yellow Fever in Merida, Yucatan.**—*Ibid.* pp. 627–637.

i. *Leptospira icteroides* having been demonstrated by Noguchi in 1918 in certain cases of yellow fever in Guayaquil, it became advisable to control this finding in cases of the disease in other localities. Accordingly Noguchi and Kligler have conducted an investigation of the disease in Merida, Yucatan, and the paper now under review gives their results. Two undoubted cases were under observation and from

them guinea pigs were inoculated and cultures made. Unfortunately a paratyphoid organism contaminated the strain so that many guinea pigs and cultures were lost through secondary infections. However, the results obtained with specimens of blood from Case 2 were definitely positive, not only in the transmission of the disease to guinea pigs directly but also indirectly by means of cultures. The leptospira was demonstrated in the blood and organs of guinea pigs experimentally infected from cultures and also in the cultures themselves. Cultures were obtained from the blood of Case 2 but only those made on the second day of the disease produced a fatal infection in guinea pigs. From this series a continuous passage in guinea pigs was successfully accomplished. The leptospira in its morphology and action on the experimental animals did not differ from that previously isolated from the Guayaquil cases.

ii. The second paper records further results with the Merida strain. It showed a marked pathogenicity towards young pups, 6 weeks old, when injected intraperitoneally. The Merida strain was tested against the immune serum which had been prepared from the horse by means of the Guayaquil strain. The polyvalent horse serum and a monovalent rabbit serum had a definite devitalizing action on the leptospira, while an icterohaemorrhagiae serum had no such action.

The therapeutic action of the serum was most marked, for it was found that 0·1 cc. would protect a guinea pig against at least 5,000 minimum lethal doses of the leptospira of the Merida strain if given during the incubation or at an early stage of the disease, but it had almost no effect if given after the disease was well established. From the remark in the preceding paper it would appear that a much smaller amount of serum protects the guinea pig if given simultaneously with the leptospira. On the basis of comparative body weight a man of 80 kilos would require 20 cc. of the serum, which should be administered intravenously and, if necessary, repeated.

Four sera were collected from cases which had had yellow fever (two as long as five months previously) and a positive Pfeiffer's reaction was obtained in each case. The test was made by injecting a mixture of 0·5 cc. of serum and 1·5 cc. of pure culture of leptospira into the peritoneal cavity of a guinea pig. The exudate was withdrawn after 30 minutes for dark field examination. The serum from the two cases which had recovered from the disease five months before did not, however, protect the animals against infection. The sera from the cases were later tested in New York against the leptospira obtained originally in Guayaquil and, making allowance for the age of the sera when tested there was unmistakable evidence of specific action while there was none against a strain of icterohaemorrhagiae.

It is thus evident that the strain of leptospira isolated from yellow fever cases in Merida corresponded in every way with the organism obtained from the Guayaquil cases in the earlier investigations.

C. M. W.

Connor (M. E.). **Yellow Fever Control in Ecuador. Final Report.**—*Jl. Amer. Med. Assoc.* 1920. Oct. 30. Vol. 75. No. 18. pp. 1184–1187. With 2 charts in text.

An account is given of the outbreak of yellow fever which occurred in Guayaquil between January 1918 and December 1919. The outbreak was largely due to the crippling of the department of health of Ecuador owing to the curtailment of revenue as a result of the war.

When energetic measures of Stegomyia reduction were recommenced a classification of the breeding places was made into two groups: firstly, the tanks, and secondly, other depositories, such as barrels, tins, pails, etc. The former group showed that 100 per cent. were functioning as Stegomyia breeding places, while the second group gave a very much lower figure which reached its highest point of 10 per cent. in April, 1920, after the yellow fever had been eradicated. It was noted that within two months of the tank protection, the percentage of these with stegomyia larvae was reduced to 50 instead of 100 per cent., so that the disease began to decline and with further reduction it disappeared entirely. It is therefore concluded that the tank as a breeding place is much more important from the point of view of yellow fever than the receptacles of the second group, which are relatively unimportant. The tanks were protected by suitable covers. Fish were used with excellent results for barrels and similar containers but not for tanks, as these are generally raised so that a ladder is needed for inspecting the fish, which may die when the water is run off to a large extent.

C. M. W.

The Director will be glad to hear from any reader who is prepared to undertake the summary or review of papers or monographs in European languages other than English and French.

BOOK REVIEW.

KHOURI (Joseph). [Docteur de l'Université de Paris (Pharmacie). etc.], **Essai d'urologie pathologique des pays chauds.**—pp. v + 183. 1919. Alexandria (Egypt). [Price not stated.]

This monograph is devoted to a study of the chemical and bacteriological properties of the urine in the more familiar tropical diseases, the descriptions being based upon the experience of the author as urological specialist in Alexandria, as well as upon a digest of the literature at his disposal.

It must be admitted that, although accurate information upon this subject has hitherto been lacking, our knowledge of tropical diseases has not been particularly enriched by the present study ; most of the references in the text being to articles and text-books of a bygone age, and comparatively few, save in the section on spirochaetosis icterohaemorrhagica, being to publications of recent date. Small variations in the physical characters of the urinary excretion, the presence of minute quantities of albumin or of urinary indigogens, may be of practical, but of little diagnostic significance in the diseases under consideration ; nor does the author always observe a critical attitude towards the sources whence he derives his information.

The second part of the book, consisting of 60 pages, is occupied with an account of the methods of recognition and elimination of the principal drugs utilised in tropical disease. Here the information is of a higher order and one not easy of access in medical literature.

The best account deals with the qualitative and quantitative estimation of arsenic ; on the other hand, there is very little information upon the excretion of antimony or on the form in which it appears in the urine. The section dealing with quinine excretion is particularly disappointing ; few references to recent literature appear. Neither NIERENSTEIN'S work nor the Mayer-Tanret reaction is mentioned.

The method of setting forth the references upon which the author lays such stress is singularly unsatisfactory. In some instances the title and source of the paper are quoted in full ; in others again they are omitted and the abbreviations of medical publications, such as Ch.G. or C.R., are quite unintelligible. Names of English authorities are curiously misspelt—Hugues appears for HUGHES : Christofers for CHRISTOPHERS.

In the literature dealing with chyluria one misses any mention of the classical works on this subject : the names of MANSON, MACKENZIE, LOW, YORKE and BLACKLOCK do not appear.

Philip Manson-Bahr.

Reprints and Pamphlets received :—

BARBIERI (Antonio). Método sistemático de profilaxis antimalárica. La cura pre-epidémica.—Reprinted from *La Prensa Médica Argentina*. 1918. May 10.

——. La campaña antipalúdica durante el año 1919. (Memoria de la Sección Central.)—Reprinted from *An. del Depart. Nac. Hig.* Buenos Aires. 1920. Feb. Vol. 26.

——. La substitución de los ranchos por viviendas higiénicas, en las provincias afectadas por el paludismo.—*Ibid.* 1920. May and June.

CACACE (Ernesto). La Cattedra ambulante d'igiene infantile o di puericultura e la Scuola popolare di maternità nelle provincie di Napoli e di Caserta.—Reprinted from *Nipiologia*. 1920. Vol. 6. No. 1.

——. Per la Nipiologia.—*Ibid.* Nos. 2-3.

CAWSTON (F. G.). Antimony in Leprosy.—Reprinted from *Brit. Med. Jl.* 1920. July 17.

——. Some Infections due to Freshwater Snails and their Eradication.—Reprinted from *Jl. Trop. Med. & Hyg.* 1920. Nov. 15.

FRANCA (Carlos). Notes de Zoologie Médicale. Observations sur le genre *Phlebotomus*.—Reprinted from *Broteria* (Serie Zoologica). 1919. Vol. 17. Nos. 2 & 3. 59 pp. With 38 text-figs.

——. La flagellose des Euphorbes.—Reprinted from *Ann. Inst. Pasteur*. 1920. July.

GRASSI (B.). L'Anofele può propagare la malaria anche direttamente ?—Reprinted from *R. Accad. Naz. dei Lincei*. 1921. Jan. 2.

MACCALLAN (Arthur Ferguson). Four Years' Work with the Ophthalmic Hospitals in Egypt.—Reprinted from the *Ophthalmoscope*, 1907. Sept. 11. pp.

——. The Relief of Eye Disease in Egypt, with Some Consideration of the Incidence of Blindness and Trachoma.—*Ibid.* 1909. Oct. 4 pp.

——. What are the Best Means to Adopt to Avoid the Spread of the Forms of Ophthalmia which May Lead to Blindness ?—*Ibid.* 1911. Dec. 8 pp.

——. Egyptian Ophthalmic Hospitals and the War.—*Ibid.* 1916. Dec. 3 pp.

——. The Egyptian Ophthalmic Hospitals Department of Public Health. Abstract of a Paper read at the Annual Meeting of the British Medical Association, London, 1910. 3 pp. Cairo. Al-Hilal Printing Office.

——. Ophthalmic Hospitals in Egypt.—Reprinted from the *Ophthalmic Record*. 1910. Dec. 14 pp. With 8 illustrations.

——. Les divisions du trachoma, le traitement de cette affection et de ses complications.—Reprinted from *Arch. d'Ophthalmologie*. 1911. Sept. 15 pp.

MAY (Henry G.). Observations on the Nematode Genus Nematodirus with Descriptions of New Species.—Reprinted from the *Proc. U.S. Nat. Museum*. Vol. 581. No. 2350.

Noc (F.). Gouvernement général de l'Afrique occidentale française. Rapport sur le fonctionnement du Laboratoire de Bactériologie de l'A.O.F. en 1919. 32 pp. Dakar : Imprimerie de la Mission Catholique.

——. Les Spirochétoses humaines à Dakar (Sénégal).—Reprinted from *Bull. Soc. Path. Exot.* 1920. Oct. 13.

——, Henry (V.) & Esquier (A.). L'Anguillule intestinale de l'homme au Sénégal (*Strongyloides intestinalis*, Bavay, 1877.)—*Ibid.* 1920. July 7.

Wood (Edward J.). Pellagra. A Clinical Lecture Delivered to Graduates at the Royal Infirmary, Edinburgh, 9th August 1920.—Reprinted from the *Edinburgh Med. Jl.* 1920. Dec.

Yorke (Warrington). On Human Trypanosomiasis in Peru.—Reprinted from *Ann. Trop. Med. & Parasit.* 1920. Mar. 15.

—— & Macfie (J. W. S.). *Strongylidae* in Horses : ix. *Cylicostomum tridentatum*, sp. n. x. On the Genus Poteriostomum, Quiel. xi. Species found in West Africa and Jamaica. xii. *Cylindropharynx rhodesiensis*, sp. n. xiii. *Cylicostomum triramosum*, sp. n. —*Ibid.* 1920. Nov. 27.

—— & Southwell (T.). *Crossocephalus Zebrae*, n. sp.—*Ibid.* 1920. June 30.

Note.—On direct application (not through agents or booksellers) any of the foregoing reprints or pamphlets will be sent on loan to any part of the world, the Bureau paying outward postage.

BOOKS RECEIVED.

Khouri (Joseph). [Docteur de l'Université de Paris (Pharmacie).] Essai d'urologie pathologique des pays chauds.—v + 183 pp. 1919. Alexandrie, Egypt. [Price not stated.]

MacCallan (A. F.). [M.D. Cambridge, F.R.C.S. England.] Trachoma and its Complications in Egypt.—vi + 74 pp. 1913. Cambridge : at the University Press. [Price not stated.]

Penna (José) & Barbieri (Antonio). El paludismo y su profilaxis en la Argentina.—390 pp. With 2 coloured plates, 4 folding maps and various illustrations. 1916. Buenos Aires : Establecimiento Gráfico, M. Rodriguez Giles, 434, Loria 444.

Stitt (E. R.). [A.B., Ph.G., M.D., Sc.D., LL.D., etc.] Practical Bacteriology, Blood Work and Animal Parasitology, including Bacteriological Keys, Zoological Tables and Explanatory Clinical Notes.—xi + 633 pp. With 1 plate and 177 text-figs. Sixth Edition, Revised & Enlarged. 1921. London : H. K. Lewis & Co., Ltd. [Price 20s. net.]

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